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MISCELLANEOUS INFORMATION.

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CCCCLXXVIII.—NEW RUBBER INDUSTRY IN LAGOS.

(*Kickxia africana*, Benth.).

(With Plate.)

In the *Kew Bulletin*, 1888, pp. 253–261, there is an account of rubber extracted at Lagos from the "Abba" tree (*Ficus Vogelii*, Miq.). A further account is given in the *Bulletin*, 1890, pp. 89–93. This rubber, although promising, "could not be used by itself," and attention has since been devoted to other sources of supply. In West Africa it is well known there are numerous plants yielding commercial rubber. The chief of these are species of the Apocynaceous genus *Landolphia*, consisting of climbing shrubs, with stems 4 to 6 inches in diameter dividing above into numerous branches, and supporting themselves on neighbouring trees. From these, and similar plants, a very important rubber industry was started at the Gold Coast by Sir Alfred Moloney, K.C.M.G., in 1882; and although previous to that year no rubber whatever was exported from that colony, it had attained in 1893 to the annual value of 200,000*l*. This is a remarkable and striking instance of the creation of a new industry by official action, and it deserves to be recorded. In 1882 Sir Alfred Moloney addressed a letter to the "Lagos Times" (*Forestry of West Africa*, pp. 83–88) strongly recommending attention to the possibilities of a similar rubber industry in Lagos, and suggesting "the adoption of measures having for their object the addition of one more to the industries of the colony." The result of this was not immediately apparent. But in 1894 the present Governor of Lagos, Sir Gilbert T. Carter, K.C.M.G., issued the following notice, as appears from the *Report* on the Botanic Station for the quarter ending the 30th June 1895:—

"His Excellency, the Governor, desires to notify to the mercantile community of Lagos that he has been able to induce a party of natives from the Gold Coast experienced in rubber collecting to come to Lagos, with a view to the development of this valuable and important industry. The men have already inspected certain districts, which they report to be rich in rubber-producing plants, and it is confidently hoped that

Lagos will shortly be able to compete with the sister colony of the Gold Coast in the great export of the product."

Following this came the announcement that a new rubber-yielding plant had been discovered in the colony of Lagos, and that it was a large tree abundantly distributed in the interior forests.

In the report on the Botanic Station at Lagos for the quarter ending 31st December 1894 the Curator states: The rubber industry of the colony is rapidly extending. Large quantities are collected around Jubi Ode. There is no doubt that the rubber supply of West Africa is not confined to species of *Landolphia* and *Ficus*. A large tree, probably belonging to the *Apocynaceæ*, found abundantly in the interior lands, also yields rubber. Mr. Leigh, one of the assistants at the station, was away above a week collecting specimens of this rubber. When ready they will be submitted to the authorities at Kew for a report. The native name of the tree is "Ire." Mr. Millen adds, "It may prove very valuable to the colony."

In April 1895, Captain Denton, C.M.G., the Acting-Governor, communicated some specimens to Kew with the following remarks:—

"I send you by parcel post some specimens of the tree—native name Irai—from which the rubber which is sent from this part of the world is obtained. During the last six months it has become a valuable article of export, and there appears to be every chance of the quantity produced increasing. I obtained these specimens from the district between Ilogbero and Ilaso, where I saw the process of procuring the juice from the tree in course of progress. The Irai tree, at the base, is between 3 and 4 feet in circumference, and is some 30 to 40 feet high. The natives score the bark to a depth of five-eighths of an inch, and the men, who have had experience of the work in other places, contend that the tree can be tapped again with good results in about 18 months' time. If this is so, we have started what is likely to prove a valuable industry."

So far it had not been possible to identify this new rubber-yielding tree. The specimens hitherto received at Kew were imperfect, and in some cases even consisted of portions of totally different plants. The next contribution received was from Mr. Jonathan C. Olubi, F.R.G.S., who forwarded excellent specimens of the tree and samples of the rubber, accompanying them with the following interesting letter:—

Mamu Forest Station, Ibadan District,
Lagos, May 3, 1895.

Dear Sir,

For identification, improvement on, and advice about the rubber tree discovered in this forest not quite a year ago by the energy of Governor Carter, I now send you the following parcels.

I have seen many foreign rubber trees and vines in the Botanic Station at Lagos such as the Kosa rubber, Para rubber and the *Ficus elastica*, but not this particular tree that I am going to describe. It was first discovered in Accra about the year 1883 and from its resources many Europeans and natives have made their fortunes. The native name of this rubber tree is Ire, Ireh, or Ereh.

The Ire tree is one of the most beautiful trees in the forest. From the ground it grows evenly in bulk and smoothly to the height of 60 to 70 feet. The average thickness of the tree is 12 to 14 inches in diameter. In the rainy season, when the trees are full of milk, a tree well tapped is capable of producing from 10 to 15 lbs. of rubber, which is worth about 1*s.* per lb. here if properly prepared, and 2*s.* 1*d.* to 2*s.* 4*d.* in English markets if made into biscuit.

The present method by which the milk is extracted is shown on the piece of stick enclosed, and this is said to be the most perfect way

known to the natives. I have heard of an instrument by which one can easily extract the milk; can you give any help or direct me to where I can get a sample? There are many ways in which the milk is prepared: first by cutting a coffin-like hole in the trunk of a tree and throwing in milk daily until it is full, then the milk is well covered, airtight if possible, and within a month it is quite solid. Of course in the rainy season it may take two months before it is solid. This is known as the silk rubber.

The one gathered and cooked in water and whose appearance shows white after cooking (although the atmospheric influence causes it to get black after some days of exposure) is known as the first quality rubber. The rubber cooked as gathered and thickened by heat directly in the pot obtains varied prices. Can one improve on these methods? I know of one method, but it is difficult to follow, for one cannot get the fresh milk. The custom is to purchase already cooked milk. The preparation I speak of is to allow the milk to remain in cold water (about double the proportion of the milk) for twenty-four hours, then the milk floats. This is then gathered and put in a bag, which can be hung up for perfect draining or the bag put in a box with so many holes for the water to escape. This fetches a good, and, I dare say, the best value; but unless one can command his own forest the fresh milk is hard to get. The sample of rubber sent is of the general preparation cooked as brought from the tree. If desirable I shall send you a two feet long log of the rubber tree. For any name appropriate for the tree and any improvement on the preparation of the rubber, also for collecting the same, I shall thank you very much.

I remain, &c.

The Director,
Royal Gardens, Kew.

(Signed) J. C. Olubi.

The Rubber Plant.

The specimens sent by Mr. Olubi led to the identification of the new rubber plant as *Kickxia africana*, Benth. Of this plant we had very little previous information.

In May 1888, a sample of seeds marked "India-rubber seeds" from Winnebah, Gold Coast, West Africa, was forwarded to Kew by Messrs. J. Bowden & Co., Liverpool. The seeds were stated to be worth 72*s.* per lb. There was, however, no further reference made to the plant yielding them as a source of India-rubber. The seeds were determined as those of *Kickxia africana*, Benth., a tree of the order *Apocynaceæ*, known to occur in West Africa, from Sierra Leone to the delta of the Niger, and in the island of Fernando Po. As the seeds were then in commerce as a substitute for *Strophanthus* seeds, it was inferred that the high price they fetched was due to this and not to their value as a means of propagating India-rubber plants. In fact, it seems that they were never suspected to have any other importance than that they lent themselves readily for the adulteration of *Strophanthus* seeds. Thus Mr. E. M. Holmes,[1] Mr. T. Christy,[2] Dr. J. Nevinny,[3] and lately Mr. L. Planchon[4] examined the seeds of *Kickxia africana* from this point

[1] Notes on false Strophanthus seed, in *Pharm. Journ.* Vol. XVII (1887) 903, 904.
[2] New Commercial Plants and Drugs, (1887), No. 10, p. 11, and fig. 7 on p. 10.
[3] Kickxia and Strophanthus, in Z. öst. Apoth. 1887, Nos. 20, 21, 22.
[4] Produits fournis à la matière médicale par la famille des Apocynées (1894) pp. 80, 81.

of view, and they pointed out the characters in which they differed from the seeds of *Strophanthus*.

From Mr. Olubi's letter quoted above it would appear that the tree was known in Accra as early as 1883 as a rubber tree, and this evidently accounts for the sample of seeds sent by Messrs. Bowden & Co., to Kew, in 1888, being called India-rubber seeds.

The vernacular name of the tree is spelt Ire, Iré, Irai, Ireh, and Ereh. A similar name "Ere" occurs in Moloney's List of Timbers in *Forestry of West Africa*, p. 207, No. 6. It is there applied to a tree 25–33 feet high and 4 feet in diameter, but no further particulars are given.

The description of *Kickxia africana* drawn up by Bentham for Hooker's *Icones Plantarum* (t. 1276) was based upon rather scanty material. Dr. Stapf who is engaged in the elaboration of the *Apocynaceæ* for the *Flora of Tropical Africa*, has therefore prepared a more complete description from the fuller material now available.

Kickxia africana, Benth. in *Hook. Ic. plant.* t. 1276 (1877–79). A large glabrous tree, 50–60 feet high with terete branchlets which turn black in drying. Leaves 4–9 in. long, 1½–3 in. broad, oblong, shortly acuminate at both ends, coriaceous, with 8–10 nerves on each side and inconspicuous veins, petiole 2–6 lin. long. Flowers in shortly peduncled, bracteate, often many flowered and much contracted cymes, originally terminal but afterwards apparently axillary, being overtopped by a branch from the axil of one of the uppermost leaves; peduncle short, to 3 lin. long; bracts small, ovate, acute; pedicels to 2 lin. long. Calyx about 1¾ lin. long, 5-partite, segments ovate, with several glands at the base. Corolla salver-shaped, yellow, tube fleshy, constricted at or just below the middle, 3 lin. long; lobes 5–6 lin. long, oblong, overlapping to the right, nearly erect in bud, then spreading. Stamens 5, inserted above the constriction of the tube and enclosed in it, filaments short and broad having a gibbous swelling on the back; anthers conniving in a cone around the stigma, to which they adhere by a glutinous secretion from the base of the anther cells, sagittate, acuminate, tipped with a few minute hairs, basal tails solid, destitute of pollen. Disc fleshy, of 5 free or more or less comate lobes closely surrounding the ovary to ⅔ of its height. Ovary of 2 free minutely hairy carpels; style filiform; stigma capitate, slightly grooved, constricted into a broad, conical apex; ovules pendulous, numerous in each cell. Follicles about 4–6 in. long, spreading, thick, spindle-shaped, with two sharp longitudinal ridges, woody. Seeds 6–7 lin. long, spindle-shaped, compressed, brown, with a long basal awn (pointing towards the base of the follicle), and a fine point on the other end; awn naked at the base, otherwise covered with long reversed silky hairs; albumen forming a thin or rather thick coat around the embryo; cotyledons contortuplicate and much longer than the superior radicle.

The laticiferous vessels are found in great numbers in the inner bark within a zone of hardened tissue and accompanied by cells containing crystals.

The habitat of *Kickxia africana* was stated in the *Icones* to be "West Tropical Africa, Bagroo River, and Fernando Po, Mann No. 817, Bonny, Kalbreyer." It is evident that it has a very wide distribution, extending from Sierra Leone to the Gold Coast and beyond the mouths of the Niger to the Bight of Biafra. How far it may extend inland it is impossible to say.

In September last Kew received from Captain Denton, C.M.G., two pieces of the trunk of the Lagos rubber tree, each about 10 inches to a foot in diameter, scored with the marks of the rubber gatherers. These will be placed in the Kew museums. They were sent as the "female" rubber tree, a name we learn that is locally applied to the *Kickxia africana*, Benth. It is thus distinguished from *Holarrhena africana*, quite a different plant, which is fancifully called the "male" rubber tree. The latter is a Rubiaceous plant not known to yield any rubber.

As showing the remarkable development which has taken place in the rubber industry at Lagos during the last six months, the Acting Governor has furnished Kew with the following particulars :—

RETURN of RUBBER exported from LAGOS during the half year ended June 30, 1895.

Month.	Weight.	Value.
	lbs.	£ s. d.
January	21,131	1,213 10 3
February	15,388	777 0 11
March	26,316	1,419 7 8
April	39,763	2,078 16 6
May	216,916	11,700 0 7
June	268,619	12,577 2 6
Total	588,633	29,765 18 5

E. A. LOVELL, Collector of Customs.

July 12, 1895.

EXTRACTING THE RUBBER.

The following information respecting the mode of tapping the Ire trees and preparing the rubber is taken from the *Report* of the Botanic Station at Lagos for the quarter ended 31st March 1895. This Report was prepared during the absence of Mr. Millen on leave by Mr. F. G. R. Leigh, the acting-curator.

In tapping the trees the bark is first cut in a vertical direction from the bottom to the top. This single line is about $\frac{1}{2}$ to $\frac{5}{8}$ of an inch broad, and deep enough to reach the inner bark. This forms the main groove. On each side of this two series of oblique grooves, about two feet apart, are cut, each running into the main groove. The side grooves are made, beginning at the top, and gradually reaching the base of the tree. All the milk exuding from the lateral grooves will find its way into the main groove and so ultimately reach the bottom, where a vessel is placed to receive it. When sufficient milk has accumulated it is then collected and made into rubber.

The methods adopted for coagulating the milk are then described. These are at present of two kinds, viz.: "the cold process" and "the heat process." The cold process is chiefly practised by the Fanti men introduced from the Gold Coast. A cavity is excavated in the trunk of a fallen tree so as to form a cistern of the capacity necessary for holding the milk collected during several days. Into this the rubber gatherers

pour the milk, after straining it, from day to day until it is quite full. It is then covered with palm leaves and left for 12 to 14 days and sometimes much longer, depending on the season, until most of the watery portions have either evaporated or sunk into the wood. After being kneaded and pressed together the rubber thus obtained has a dark brownish colour, with the inner portions of a slightly lighter colour. Such rubber is known locally as "silk rubber."

The local price is from 10*d.* to 1*s.* 2*d.* per pound.

The heat process is the one generally adopted by the natives of Lagos. This is much simpler in working, as it disposes of all the milk collected at the close of each day. After being strained the milk is placed in a vessel and boiled. The rubber begins to coagulate almost directly the heat is applied, and after the boiling is over is removed in a somewhat sticky condition, owing to being burnt, and of a blackish colour. The local price of this rubber is from 9*d.* to 1*s.* per pound. It is pointed out that the heat process, though simpler, impairs the quality of the rubber, and is calculated to injure the industry. It is probable that if the heat process were somewhat modified the results would not be so injurious. An experiment was tried at the Botanic Station to coagulate the milk by heat, but not applied directly to it. The result was much more satisfactory. The rubber came off of a milky white colour, and after being pressed it was clean and firm without being sticky. A sample of this received at Kew was reported upon by Messrs. Hecht, Lewis, and Kahn. It is the sample referred to below as No. 2.

Messrs. Hecht, Levis, and Kahn to Royal Gardens, Kew.

21, Mincing Lane, London, E.C.,
September 13, 1895.

Dear Sir,

We have your yesterday's lines, and also two samples of Lagos rubber.

We have had, both in Liverpool and in Hamburg, for the last six months, large imports of rubber from Lagos, and this description seems to have been favourably received by consumers.

Your sample No. 2 is of very fine quality, and would be worth, if sent in the same clean and dry condition, from 2*s.* 3*d.* to 2*s.* 4*d.* per lb. Your sample No. 3 is also good, but less close in texture and much damper, which seriously detracts from its value. Still, the rubber is cleaner than the average arrivals from Lagos, and to-day's value would be about 1*s.* 5*d.* to 1*s.* 6*d.* per lb.

From what we hear the production of rubber in Lagos is likely to increase largely, and we only hope that the producers will keep the rubber as clean and free from impurities as possible.

Always at your service,

We remain, &c.

John R. Jackson, Esq.,
Royal Gardens, Kew.

(Signed) Hecht, Levis, & Kahn.

The history of this new rubber industry in Lagos is full of interest, and illustrates the wonderfully rich resources of the vast forests of West Africa. It shows also very clearly how largely these resources can be developed by judicious and intelligent action on the part of the Government.

Should the new *Kickxia* rubber continue of commercial value, there is no doubt that it will eventually be possible to establish regular

M. Smith del,

Vincent Brooks, Day & Son lith

Kickxia africana, Benth.

plantations, and thus make the industry a permanent one. It has always been seen that owing to the climbing habit of the species of *Landolphia* which have hitherto yielded African rubber, it was not practicable to cultivate them in regular plantations as they required the support of other plants, and when once tapped many years would have to elapse before they would be fit to yield another crop. With the *Kickxia* these practical difficulties disappear.

The important position now occupied by the rubber industry in British Possessions in West Africa may be gathered from the following table compiled from the Supplement to the *India Rubber Journal* of August 12, 1895 :—

Return of Raw Caoutchouc received in the United Kingdom from British West Africa, including the Gold Coast and Lagos.

Year.	Weight.	Value.	Average price per Cwt.
	Cwts.	£	s.
1890 - - -	33,876	297,453	175
1891 - - -	48,164	408,646	169
1892 - - -	41,967	357,133	170
1893 - - -	54,357	452,799	166
1894 - - -	47,466	393,990	166
Total - -	225,830	1,910,021	169

Explanation of Plate.

1. Flowering branch (natural size). 2. Bud. 3. Segment of calyx with glands at the base. 4. Corolla, cut open with style and stigma removed. 5. Anther, front view. 6. Pistil with disk (*d*). 7. A pair of follicles (natural size). 8. Seed. 9. Transverse section of seed (*t.* testa, *a.* albumen, *c.* cavity). Nos. 2 to 6 and 8 and 9 all enlarged.

CCCCLXXIX.—DIAGNOSES AFRICANÆ, VIII.

(*Continued from p.* 230.)

Asclepiadeæ.

Auctore, N. E. Brown.

326. **Tacazzia conferta**, *N. E. Brown;* caule puberulo, foliis oblongis vel oblongo-lanceolatis acuminatis utrinque glabris, paniculis corymbiformibus subsessilibus vel breviter pedunculatis, floribus ad apices ramulorum umbellatis, sepalis late ovatis obtusis vel subacutis ciliolatis, corollæ lobis late oblongis obtusis emarginatis, coronæ lobis filiformibus apice tortuosis.

Habitat.—Abyssinia : Efat, *Roth*, 407.

Foliorum petioli ½ poll. longi, laminæ 2½–4 poll. longæ, 1–1½ poll. latæ. *Pedicelli* 2–3 lin. longi. *Sepala* ¾–1 lin. longa. *Corollæ lobi* 2–2½ lin. longi.

327. **Tacazzia nigritana**, *N. E. Brown;* caule glabro, foliis oblongis versus apicem cuspidato-acutum leviter angustatis supra glabris subtus pubescentibus, paniculis pedunculatis glabris, sepalis late ovatis subacutis glabris, corolla glabra, coronæ lobis filiformibus erectis.

Habitat.—Niger territory: Aboh, *Barter*, 486.

Foliorum petioli ¾ lin. longi, laminæ 2½–3 poll. longæ, 10–13 lin. latæ. *Paniculæ* 2 poll. longæ. *Pedunculi* 6–9 lin. longi. *Pedicelli* 2–3½ lin. longi. *Sepala* ½ lin. longa. *Corollæ lobi* 2–2½ lin. longi.

328. **Taccazzia Kirkii**, *N. E. Brown*; caule tomentoso, foliis ellipticis vel elliptico-oblongis obtusis cuspidato-apiculatis vel subacutis basi cordatis subcordatis vel obtuse rotundatis subtus tomentosis, pedunculis pedicellisque subglabris vel parce et breviter hirtis sepalis ovatis acutis plus minusve breviter hirtis, corolla glabra, coronæ lobis filiformibus erectis tortuosis, folliculis pubescentibus.

Habitat.—Zambesi region: Lupata and near Tete, *Kirk.* Natal, *Gerrard*, 1796.

Foliorum petioli 4–18 lin. longi, laminæ 1¼–4 poll. longæ, 1–2¼ poll. latæ. *Paniculæ* 2–4 poll. longæ. *Pedunculi* ½–¾ poll. longi. *Pedicelli* 1½–3 lin. longi. *Sepala* 1 lin. longa. *Corollæ lobi* 2½ lin. longi. *Folliculæ* 1½–2¼ poll. longæ, 3½–4½ lin. crassæ.

329. **Raphionacme angolensis**, *N. E. Brown;* caule pubescente erecto, foliis petiolatis ellipticis vel elliptico-oblongis obtusis utrinque pubescentibus, cymis terminalibus multifloris, pedicellis atque sepalis lanceolatis acuminatis pubescentibus, corollæ lobis oblongis vel oblongo-lanceolatis basi bicarinatis extus pubescentibus intus glabris, coronæ lobis subulatis.

Habitat.—Angola: Pungo Andongo, *Welwitsch*, 4201, 4202.

Foliorum petioli 2–7 lin. longi, laminæ 1–2¾ poll. longæ, ½–1¾ poll. latæ. *Pedicelli* 2–6 lin. longi. *Sepala* 1½–2 lin. longa. *Corollæ tubus* 2 lin. longus, lobi 4 lin. longi. *Coronæ lobi* 2½ lin. longi.

This is the plant described by the late Dr. Baillon as *Zaczatea angolensis*, in Bull. Soc. Linn. Paris, 1889, II., p. 806.

330. **Secamone retusa**, *N. E. Brown;* glabra, foliis oblongis vel ovato-oblongis retusis vel emarginatis apiculatis, cymis laxis pedunculatis, sepalis ellipticis obtusis, corollæ rotato-campanulatæ lobis oblongis obtusis, coronæ lobis minutis deltoideo-subulatis, stylo apice late obconico truncato-bilobo ultra antheras exserto.

Habitat.—Zanzibar, *Kirk.*

Foliorum petioli 1–1½ lin. longi, laminæ 1–2 poll. longæ, 7–10 lin. latæ. *Pedicelli* 1½–2 lin. longi. *Corolla* 2 lin. diam.

331. **Secamone Kirkii**, *N. E. Brown;* glabra, foliis elliptico-oblongis subabrupte acuminatis, cymis laxis pedunculatis, sepalis late ovatis subacutis ciliolatis, corollæ rotato-campanulatæ lobis oblongis obtusis, coronæ lobis falcatis acutis, stylo apice terete subacuto minute bilobulato ultra antheras exserto.

Habitat.—Zanzibar, *Kirk.*

Foliorum petioli 1½–2½ lin. longi, laminæ 1–2¼ poll. longæ, 6–16 lin. latæ. *Pedicelli* 2–3 lin. longi. *Sepala* ½ lin. longa. *Corolla* 2 lin. diam.

332. **Secamone gracilis**, *N. E. Brown;* glabra, ramis gracilibus, foliis oblongis obtusis basi rotundatis vel cuneatis, pedunculis 1–2-floris,

pedicellis gracilibus, sepalis ovatis vel oblongis obtusis vel subacutis, corollæ campanulatæ submembranaceæ lobis oblongis obtusis, coronæ lobis falcatis, stylo apice late obconico subtruncato-bilobo ultra antheras exserto.

Habitat.—Mombasa, *Wakefield.*

Foliorum petioli ¾–1 lin. longi, laminæ 4–8 lin. longæ, 2–4 lin. latæ. *Pedunculi* 1 lin. longi. *Pedicelli* 3 lin. longi. *Sepala* vix ½ lin. longa. *Corolla* 2 lin. longa.

333. **Microstephanus**, *N. E. Brown* [Cynanchearum genus novum]. *Calyx* 5-partitus. *Corolla* campanulata, tubo brevi, lobis angustis contortis sinistrorsum obtegentibus. *Coronæ* lobi 5, minuti, cum antheris alterni. *Columna* staminum prope basin corollæ enata, 5-sulcata. *Antheræ* erectæ, oblongæ, membranaceo-appendiculatæ, dorso valde convexæ, basi sulcatæ. *Pollinia* in quoque loculo solitaria, pendula. *Stylus* ultra antheras longe productus, apice bifidus. *Folliculi* lanceolati, acuminati, læves. *Semina* comosa. *Fruticulus* procumbens vel volubilis. *Folia* opposita. *Cymæ* umbelliformes paucifloræ ad nodos laterales. *Flores* parvi.

A genus of one species, that has hitherto been placed under *Astephanus*, but it differs from that genus in the presence of a corona, which, although minute, is quite evident when searched for, and in the different structure of the staminal-column, the anther-wings being turned inwards towards the centre of the flower, forming five deep grooves between the anthers, whilst in *Astephanus* they are turned outwards in the usual way.

M. cernuus, *N. E. Brown;* foliis petiolatis oblongis ovatis ovato-lanceolatis ovato-oblongis vel ellipticis obtusis apiculatis vel acutis glabris vel plus minusve puberulis, cymis pedunculatis 1-4 floris, sepalis ovatis acutis glabris, corollæ campanulatæ lobis linearibus oblique obtusis leviter tortis glabris.—*Astephanus cernuus*, and *A. ovatus*, Decne, in Ann. Scien. Nat. 1838, ser. 2, ix., p. 342; and in DC. Prod. viii, p. 507; *A. arenarius*, Decne, in DC. Prod. viii., p. 507; *A. recurvatus*, Klotzsch in Peters Mossamb. p. 274. *Periploca ovata*, Poir. ex. Decne. in DC. Prod. viii. p. 508.

Habitat.—East Trop. Africa: Pemba Island, *Bojer;* Zanzibar, *Bojer*, *Kirk;* Mombasa, *Hildebrandt*, 1166, 1978; Mozambique, *Kirk*, *Scott;* Usambara, *Holst*, 3037; Madagascar, *Grévé*, *Elliot*, 3011, *Commerson*, *Baron*, 6192; Aldabra Island, *Abbott.*

Foliorum petioli 2–4 lin. longi, laminæ 3 lin.–1¾ poll. longæ, 1½–8 lin. latæ. *Pedunculi* 1–2 lin. longi. *Pedicelli* 1½–2½ lin. longi. *Sepala* ½ lin. longa. *Corollæ lobi* 1½–2 lin. longi.

The foliage of this plant varies very much in form and texture, being much thicker and more fleshy in some specimens than in others, but all intermediate stages occur, and there is no difference in the flowers of the different specimens. It is a maritime plant.

334. **Glossonema affine**, *N. E. Brown;* caulibus pubescentibus, foliis petiolatis ovatis obtusis apiculatis, subtus parce pubescentibus, cymis axillaribus sessilibus 2–3 floris, pedicellis sepalisque lanceolatis acutis pubescentibus, corollæ lobis oblongo-ovatis obtusis marginibus reflexis, coronæ lobis oblongis abrupte subulatis.

Habitat.—Abyssinia, *Schimper*, 2219.

Planta 6–10 poll. alta. *Foliorum petioli* 2–5 lin. longi, laminæ ½–1 poll. longæ, 3–7 lin. latæ. *Pedicelli* 1–1½ lin. longi. *Sepala* 1–1½ lin. longa. *Corollæ lobi* 1½ lin. longi. *Coronæ lobi* 1½ lin. longi.

335. **Schizostephanus somaliensis**, *N. E. Brown;* caule puberulo, foliis longe petiolatis cordatis obtusis emarginatis fere glabris, racemis foliis brevioribus floribus solitariis vel binis subdistantibus, sepalis lanceolato-oblongis subacutis, corollæ lobis oblongis subobtusis prope apicem saccatis marginibus revolutis, corona quinquelobata lobis cuneatis trifidis intus bicarinatis.

Habitat.—Somaliland: Boobi, *James & Thrupp*.

Foliorum petioli 1¼–2 poll. longi, laminæ 1½–3 poll. longæ, 1¾–2½ poll. latæ. *Racemi* 2–3 poll. longi. *Pedicelli* 1–1½ lin. longi. *Sepala* 1–1¼ lin. longa. *Corollæ lobi* 1¾ lin. longi, 1 lin. lati. *Coronæ lobi* 1½ lin. longi.

336. **Platykeleba**, *N. E. Brown* [Cynanchearum genus novum].—*Calyx* 5-partitus. *Corolla* late rotato-campanulata, breviter 5-loba. *Corona* duplex, exterior basi corollæ semiadnata, breviter cupularis, subintegra crenulata vel sub-5-lobata, interioris lobi 5, antheris basi adnati, ovati, concavi, cum corona exteriore partitionibus 5 connexi. *Columna* staminum e basi corollæ exorta; antheræ breves, latæ, membrana inflexa appendiculatæ. *Pollinia* in quoque loculo solitaria, pendula. *Stigma* breviter rostrata, biloba.—*Frutex* aphyllus. *Umbellæ* paucifloræ, ad nodos sessiles. *Flores* majusculi.

A genus of one species, rather remarkable in appearance, with flowers resembling those of *Oxystelma*, to which genus it is probably nearest allied.

P. insignis, *N. E. Brown;* glabra, ramulis subgracilibus subsuccu-lentibus, umbellis 4–5-floris, sepalis ovatis vel ovato-lanceolatis acutis, corolla purpureo-venosa.

Habitat.—Central Madagascar, *Baron*, 973.

Rami sicci 1 lin. crassi. *Pedicelli* 2–3 lin. longi. *Sepala* ¾–1 lin. longa. *Corolla* circa 8 lin. diam., lobi 2 lin. longi, 3 lin. lati. *Corona* exterior 1½ lin. diam., coronæ interioris lobi ½ lin. longi, ⅓ lin. lati.

337. **Xysmalobium Carsoni**, *N. E. Brown;* caule simplice glabro, foliis linearibus acutis glabris, umbellis paucis lateralibus terminalibusque pedunculatis 3–4-floris, sepalis lanceolatis acutis glabris, corollæ lobis elliptico-oblongis obtusis glabris, coronæ lobis quam columna staminum paulo longioribus planis oblongis apice obtusis subdenticulatis incurvatis marginibus incurvatis.

Habitat.—Tanganyika Plateau: Fife station, *Carson*.

Caules 1–2 ped. alti. *Folia* 3–6 poll. longa, 1–1½ lin. lata. *Pedunculi* et *pedicelli* 4–6 lin. longi. *Sepala* 2 lin. longa. *Corollæ lobi* 5–6 lin. longi, 3–4 lin. lati. *Coronæ lobi* 2⅓ lin. longi, 1 lin. lati.

338. **Xysmalobium decipiens**, *N. E. Brown;* caulibus simplicibus bifariam pubescentibus, foliis linearibus acutis glabris, umbellis lateralibus terminalibusque pedunculatis multifloris, corollæ lobis arcte reflexis

oblongis acutis glabris, coronæ lobis minutis ovatis obtusissimis columnæ staminum adnatis et subtriplo brevioribus basi cum dentibus minutis alternantibus connexis.

Habitat.—Angola : Huilla, near Lopollo, *Welwitsch*, 4175.

Caules 1–1¼ ped. alti. *Folia* 3½–6 poll. longa, ½–1 lin. lata. *Pedunculi* 5–7 lin. longi. *Pedicelli* 3–4 lin. longi. *Sepala* ¾ lin. longa. *Corollæ lobi* 1¾ lin. longi, ½ lin. lati. *Coronæ lobi* ⅓ lin. longi. *Columna staminum* 1¼ lin. longa.

This species was confused with *X. Holubii*, S. Elliot, and in the original description the characters of the corona of *X. Holubii*, are unfortunately taken from this plant instead of from that collected by Holub, for which the name was intended. I retain the name *X. Holubii*, S. Elliot for Holub's plant, in which the coronal lobes are narrow-oblong obtuse, quite free from each other, and without any alternating tooth between them.

339. **Xysmalobium reticulatum**, *N. E. Brown ;* caule erecto subflexuoso bifariam pubescente, foliis breviter petiolatis anguste oblongis obtusis vel acutis apiculatis basi rotundatis vel emarginatis venis conspicuis reticulatis, sepalis reflexis lanceolatis acuminatis glabris, corollæ lobis reflexis ovatis acutis glabris, coronæ lobis quam columna staminum brevioribus obovatis plano-convexis intus carinatis.

Habitat.—Shire Highlands, *Buchanan.*

Foliorum petioli ½-1 lin. longi, laminæ 2–2¾ longæ, 3–7 lin. latæ. *Pedicelli* 3–4 lin. longi. *Sepala* 2½ lin. longi. *Corollæ lobi* 2½ lin. longi, 1¼ lin. lati. *Coronæ lobi* 1 lin. longi.

340. **Xysmalobium membraniferum**, *N.E. Brown ;* caulibus bifariam pubescentibus, foliis oblongo-lanceolatis utrinque acutis glabris, umbellis lateralibus sessilibus 6–8-floris, pedicellis pubescentibus, sepalis ovatis acutis glabris, corollæ-lobis oblongis subobtusis, coronæ lobis oblongis subacutis basi carinatis.

Habitat.—Sierra Leone : near Falaba, *Elliot*, 5184.

Caules 1–1½ ped. alti. *Foliorum petioli* 2–4 lin longi, laminæ 3–3½ poll. longæ, 4-7 lin. latæ. *Pedicelli* 4–7 lin. longi. *Sepala* 2 lin. longa. *Corollæ lobi* 3½ lin. longi, 1½ lin lati. *Coronæ lobi* 1¾ lin. longi.

341. **Xysmalobium spurium**, *N.E. Brown;* erectum, patente pubescens, foliis elongato-ovatis subobtusis basi rotundatis vel subcordatis, umbellis lateralibus et terminalibus pedunculatis 5–6 floris, corollæ campanulatæ lobis ovato-oblongis subacutis extus pubescentibus, coronæ lobis e basi staminum columnæ exortis et duplo longioribus erectis cuneato-oblongis dorso leviter carinatis apice irregulariter 3-dentatis.

Habitat.—Nyassaland : Shire Highlands, *Buchanan*, 451.

Caules 2–4 ped. alti. *Foliorum petioli* 2–4 lin. longi, laminæ 2–3½ poll. longæ, 1–1½ poll. latæ. *Pedunculi* 1¼–1½ poll. longi. *Pedicelli* 9–10 lin. longi. *Corollæ lobi* 8–9 lin. longi, 3½–4 lin. lati. *Coronæ lobi* 6 lin. longi, 2½–3 lin. lati.

342. **Xysmalobium rhomboideum**, *N. E. Brown ;* caulibus validis tomentosis, foliis ovato-oblongis subobtusis apiculatis basi cordatis vel rotundatis parce pubescentibus, umbellis lateralibus sessilibus 6–8-floris,

pedicellis subtomentosis, sepalis anguste lanceolatis acutis breviter hirtis, corollæ campanulatæ lobis ovatis subacutis extus pubescentibus, coronæ lobis e basi staminum columnæ æquilongæ exortis, erectis rhomboideis subacutis intus carinatis.

Habitat.—Angola: Huilla, *Welwitsch*, 4193.

Foliorum petioli 1½–2½ lin. longi, laminæ 1¼–3 poll. longæ, 9–13 lin. latæ. *Pedicelli* 5–6 lin. longi. *Sepala* 3½–4 lin. longa. *Corollæ lobi* 3 lin. longi, 2 lin. lati. *Coronæ lobi* 1½ lin. longi.

343. **Xysmalobium fraternum**, *N. E. Brown*; foliis oblongis vel obovato-oblongis obtusis apiculatis, basi angustatis glabris, umbellis lateralibus 7–8 floris, pedicellis pubescentibus, sepalis lanceolatis acuminatis glabris parce ciliatis, corollæ lobis ovatis acutis reflexis, coronæ lobis rhomboideo-ovatis subacutis intus carinatis.

Habitat.—Nyassaland: Shire Highlands, near Blantyre, *Last*.

Foliorum petioli 1½–2 lin. longi, laminæ 1½–2½ poll. longæ, 9–18 lin. latæ. *Pedicelli* 5–6 lin. longi. *Sepala* 2½–3 lin. longa. *Corollæ lobi* 3 lin. longi 1½ lin. lati. *Coronæ lobi* 1½ lin. longi.

344. **Schizoglossum firmum**, *N. E. Brown*; caulibus validis tomentosis, foliis elongato-ovato-oblongis subobtusis apiculatis basi cordatis petiolatis tomentosis, umbellis lateralibus pedunculatis 10–20-floris, pedicellis sepalisque lanceolatis acuminatis tomentosis, corollæ lobis ovatis subobtusis minute bifidis extus pubescentibus, coronæ lobis quam columna staminum duplo longioribus erectis basi late oblongis in subulam elongatam abrupte contractis intus carinis duobus contiguis.

Habitat.—Angola: Huilla, near Lopollo, *Welwitsch*, 4191.

Foliorum petioli 1–2½ lin. longi, laminæ 2½–3 poll. longæ, 6–12 lin. latæ. *Pedunculi* 9 lin.–1½ poll. longi. *Sepala* 2½–3 lin. longa. *Corollæ lobi* 2½ lin. longi, 1¾ lin. lati. *Coronæ lobi* 3 lin. longi.

345. **Schizoglossum quadridens**, *N. E. Brown*; caulibus erectis patente pubescentibus, foliis breviter petiolatis lanceolatis vel lineari-lanceolatis acutis vel subacutis vel inferioribus subobtusis basi angustatis vel subrotundatis vel truncatis pubescentibus marginibus revolutis, umbellis paucis lateralibus et terminalibus ad apicem caulis subcorymbosis pedunculatis, pedunculis pedicellis atque sepalis lanceolatis acutis patente pubescentibus, corollæ lobis oblongis obtusis extus parce pubescentibus intus pubescentibus albis, coronæ lobis quam columna staminum paulo longioribus planis ovatis basi subcordatis apice bidentatis intus prope apicem dentibus duobus falcatis subporrectis et leviter bicarinatis extus basi obtuse carinatis.

Habitat.—South Africa: the Plateau, East Griqualand, *Haygarth* (Herb. *Wood*, 4189.)

Planta 4–6 poll. alta. *Foliorum petioli* 1–2½ lin. longi, laminæ 1¼–2 poll. longæ, 1½–7 lin. latæ. *Pedunculi* 5–16 lin. longi. *Pedicelli* 3–5 lin. longi *Sepala* 2–3 lin. longa. *Corollæ lobi* 3–3¼ lin. longi, 1½ lin. lati. *Coronæ lobi* 1¼ lin. longi.

This much resembles *S. elingue*, N. E. Br. in appearance, but has very different coronal-lobes.

346. **Schizoglossum masaicum**, *N. E. Brown*; caulibus gracilibus simplicibus vel sparse ramosis pubescentibus, foliis lineari-filiformibus

glabris, umbellis plurimis lateralibus sessilibus 7–12 floris, pedicellis sepalisque ovato-lanceolatis acuminatis pubescentibus, corollæ lobis oblongis subacutis pubescentibus marginibus plus minusve reflexis, coronæ lobis subquadratis obtusissimis intus unicornutis et bicarinatis cornibus supra antheras incurvatis.

Habitat.—Kilimanjaro Region: Maungu, 2000 feet, *Johnston*.

Caules 1½–2 ped. alti. *Folia* 1–2 poll. longa, ½–¾ lin. lata.

Pedicelli 1½–2 lin. longi. *Corollæ lobi* 1–1¼ lin. longi. *Coronæ lobi* cornua inclusa ½ lin. longi.

347. **Schizoglossum shirense**, *N. E. Brown*; caulibus simplicibus vel raro ramosis bifariam pubescentibus, foliis linearibus puberulis demum glabris marginibus revolutis, umbellis plurimis lateralibus sessilibus 3–8-floris, pedicellis sepalisque lanceolatis acutis pubescentibus, corollæ lobis oblongo-lanceolatis acutis extus glabris intus pubescentibus fusco-purpureis, coronæ lobis subquadratis tridentatis dente intermedio longissimo subulato erecto recurvato intus cornu longo instructis et leviter bicarinatis.

Habitat.—Zambesi Region: Shupanga, *Kirk*; Shire Valley, *Kirk*, *Waller*.

Caules 2–3 ped. alti. *Folia* 1½–3 poll. longa, ½–2 lin. lata. *Pedicelli* 1–2 lin. longi. *Sepala* 1 lin. longa. *Corollæ lobi* 2½ lin. longi, ¾ lin. lati. *Coronæ lobi* 2–2¼ lin. longi.

348. **Schizoglossum multifolium**, *N. E. Brown*; caulibus simplicibus crassiusculis dense pubescentibus multifoliatis, foliis verticillatis subsessilibus vel brevissime petiolatis cuneato-oblongis vel ellipticis obtusis basi acutis vel leviter rotundatis glabris marginibus revolutis scaberulis, umbellis plurimis lateralibus sessilibus, pedicellis puberulis, sepalis lanceolatis acutis fere glabris, corollæ lobis ovatis subacutis glabris, coronæ lobis subquadratis tridentatis dente intermedio elongato subulato lateralibus minutis intus leviter carinatis.

Habitat.—Nyassaland, *Buchanan*, 965.

Caules 1½–2½ ped. vel ultra alti. *Folia* 1–2 poll. longa, 3–12 lin. lata. *Pedicelli* 2 lin. longi. *Corollæ lobi* 2 lin. longi. *Coronæ lobi* 1¼ lin. longi.

349. **Asclepias Schweinfurthii**, *N. E. Brown*; caule simplice pubescente, foliis cordatis vel cordato-lanceolatis plus minusve obtusis apiculatis glabris subtus leviter scaberulis, umbellis lateralibus pedunculatis, pedicellis sepalisque lanceolato-attenuatis acutis pubescentibus, corollæ lobis elliptico-ovatis acutis extus puberulis, coronæ lobis stellato-adscendentibus complicatis lateribus inflexis dolabriformibus apice breviter productis obtusis intus leviter gibbosis (an semper ?).

Habitat.—Jur: Ghattas, *Schweinfurth*, 1960.

Foliorum petioli 1–2 lin. longi, laminæ 2–3½ poll. longæ, 1–2½ poll. latæ. *Pedunculi* 1¼–2¾ poll. longi. *Pedicelli* 8–12 lin. longi. *Sepala* 4 lin. longa. *Corollæ lobi* 6 lin. longi, 3–3½ lin. lati. *Coronæ lobi* 3–3½ lin. longi.

350. **Asclepias conspicua**, *N. E. Brown*; caulibus ramosis subhispidis, foliis elongato-ovatis acutis basi cordatis scabris, umbellis paucis 3–4-floris pedunculatis, pedunculis pedicellis sepalisque lanceolatis acuminatis hispidulis, corollæ lobis elliptico-oblongis subacutis ciliolatis

extus puberulis, coronæ lobis oblongis complicatis intus bicarinatis lateribus inflexis infra medium dentatis.

Habitat.—Fwambo, south of Lake Tanganyika, *Carson*, 12.

Foliorum petioli, 1–3 lin. longi, laminæ 1½–2½ poll. longæ, ½–1 poll. latæ. *Pedunculi* 2½–4 poll. longi. *Sepala* 3-4 lin. longa. *Corollæ lobi* 6–7 lin. longi, 4–4½ lin. lati. *Coronæ lobi* 4 lin. longi.

351. **Asclepias fulva**, *N. E. Brown;* caule simplice ferrugineo-pubescente, foliis oblongis subacutis basi subcordatis vel emarginatis utrinque ferrugineo-pubescentibus demum glabratis, umbellis paucis 6–8-floris pedunculatis, sepalis lineari-lanceolatis acutis reflexis ferrugineo-puberulis, corollæ lobis ovatis subacutis reflexis extus ferrugineo-puberulis, coronæ lobis subquadratis oblique rostratis rostro complicato-bipartito supra antheras inflexo.

Habitat.—Uganda, *Wilson*, 112.

Foliorum petioli 1–2 lin. longi, laminæ 1½–3 poll. longæ, ½–1 poll latæ. *Pedunculi* 1½–2 poll. longi. *Pedicelli* 6–9 lin. longi. *Sepala* 3 lin. longa. *Corollæ lobi* 5 lin. longi, 3 lin. lati. *Coronæ lobi* 2 lin. longi.

352. **Asclepias albida**, *N. E. Brown;* caulibus elatis pubescentibus, foliis brevissime petiolatis linearibus acuminatis basi cuneatis marginibus revolutis fere glabris, umbellis lateralibus pedunculatis 4–10-floris, pedicellis sepalisque lanceolatis acuminatis pubescentibus, corollæ lobis reflexis ellipticis obtusis extus glabris intus microscopice puberulis, coronæ lobis quam columna staminum subduplo longioribus complicatis marginibus apicalibus ad medium incisis cum dentibus late falcatis ex angulis interioribus reflexis intus nudis basi utrinque gibbosis.

Habitat.—Abyssinia, *Schimper*, 27.

Folia 4–6 poll. longa, 1–2½ lin. lata. *Pedunculi* ¾–1¼ poll. longi *Pedicelli* ¾–1 poll. longi. *Sepala* 3–3½ lin. longa. *Corollæ lobi* 6 lin. longi, 3½–4 lin. lati. *Coronæ lobi* 3 lin. longi.

353. **Asclepias propinqua**, *N. E. Brown;* caule humili pubescente, foliis linearibus vel lineari-filiformibus marginibus revolutis subtomentosis, umbellis terminalibus pedunculatis 3–4 - floris, pedicellis sepalisque lanceolatis acutis pubescentibus, corollæ lobis ovato-oblongis subobtusis, coronæ lobis quam columna staminum multo longioribus complicatis apice obtuse rotundatis lateribus inflexis in dentes falcatos productis sursum directis intus dente oblongo obtuso instructis.

Habitat.—Kilimanjaro, *Smith.*

Folia ¾–1¼ poll. longa, ½–1 lin. lata. *Pedunculi* 1–1¾ poll. longi. *Pedicelli* 7½–12 lin. longi. *Sepala* 2½–3 lin. longa. *Corollæ lobi* 5 lin. longi, 3 lin. lati. *Coronæ lobi* 3–3½ lin. longi.

354. **Asclepias spectabilis**, *N. E. Brown;* caulibus validis pubescentibus, foliis lanceolatis acutis basi plus minusve rotundatis pubescentibus, umbellis lateralibus terminalibusque pedunculatis, pedicellis sepalisque lanceolatis acuminatis pubescentibus, corollæ lobis oblongis obtusis plus minusve replicatis, coronæ lobis quam columna staminum longioribus complicatis apice oblongo-ovatis obtusis lateribus inflexis in dentes falcatos acutos vel lineari-oblongos truncatos productis prope basin utrinque gibbosis intus cornu subulato vel oblongo instructis.

Habitat.—Nyassaland; *Buchanan*, 441, 553; Blantyre, *Last;* Magomera Mission Station, 3000 feet, *Waller.*

Foliorum petioli 1–6 lin. longi, laminæ 3½–7 poll. longæ, 1–2 poll. latæ. *Pedunculi* ¾–1¾ poll. longi. *Pedicelli* ¾–1¼ poll. longi. *Sepala* 4–4½ lin. longa. *Corollæ lobi* 9 lin. longi, 3½ lin. lati. *Coronæ lobi* 4 lin. longi.

355. **Asclepias flavida**, *N. E. Brown ;* fruticosa, ramosa, ramis patentibus albo-tomentosis, foliis lincaribus acutis marginibus revolutis glabris subtus secus costam pubescentibus, umbellis ad nodos lateralibus pedunculatis 4–6-floris, pedunculis pedicellis atque sepalis anguste lanceolatis acuminatis albo-tomentosis, corolla profunde 5–loba reflexa lobis ellipticoovatis acutis glabris in uno margine ciliatis, coronæ lobis supra staminum columnæ basin exortis et columnæ apicem attingentibus complicatis subquadratis angulis interioribus dentibus falcatis abrupte reflexis instructis intus ecornutis, folliculis immaturis ellipsoideis breviter cuspidato-rostratis parce setosis subglabris.

Habitat.—Somaliland: Darsa, Surry, Golis Range, *Miss Cole, Mrs. Lort Phillips.*

Frutex 3–4½ ped. altus. *Folia* 1½–3 poll. longa, 1–3 lin. lata. *Pedunculi* 7–11 lin. longi. *Pedicelli* 7–11 lin. longi. *Sepala* 1½–2 lin. longa. *Corollæ lobi* 4 lin. longi, 2½ lin. lati. *Coronæ lobi* 2 lin. longi, 1½ lin. lati. *Columna staminum* 2½ lin. longa.

356. **Asclepias tenuifolia**, *N. E. Brown ;* caulibus tenuibus ramosis pubescentibus, foliis filiformibus pubescentibus, umbellis lateralibus et terminalibus pedunculatis 3–5-floris, pedunculis pedicellis sepalisque lanceolatis acuminatis pubescentibus, corollæ lobis ellipticis subobtusis extus pubescentibus, coronæ lobis complicatis fere semiorbiculatis apice truncatis lateribus ad apicem in dentes porrectos productis.

Habitat.—Matabeleland, *Baines.*

Folia 1–2½ poll. longa. *Pedunculi* 4–6 lin. longi. *Pedicelli* 4–5 lin. longi. *Sepala* 1–1¼ lin. longa. *Corollæ lobi* 2–2¼ lin. longi, 1½ lin. lati. *Coronæ lobi* 1 lin. longi.

357.—**Asclepias pygmæa**, *N. E. Brown ;* nana, caulibus pubescentibus, foliis linearibus acutis scaberulis, umbellis paucis subcorymbosis pedunculatis 4–6-floris, pedunculis pedicellis sepalisque lanceolatis acutis pubescentibus, corollæ lobis oblongis subobtusis extus pubescentibus, coronæ lobis stellato-radiantibus complicatis lateribus ad basin in dentes erectos late deltoideos productis.

Habitat.—The lower plateau north of Lake Nyassa, *Thomson.*

Planta 3–4 poll. alta. *Folia* 1–2 poll. longa, ½ lin. lata. *Pedunculi* 6–9 lin. longi. *Pedicelli* 4–6 lin longi. *Sepala* 2 lin. longa. *Corollæ lobi* 2½–3 lin. longi, 1½ lin. lati. *Coronæ lobi* 2 lin. longi.

358. **Margaretta distincta**, *N. E. Brown ;* erecta pubescens, foliis breviter petiolatis oblongis vel lanceolato-oblongis subobtusis basi cordatis, umbellis pedunculatis lateralibus et terminalibus 6–10-floris, sepalis lanceolato-acuminatis, corollæ campanulatæ lobis ovato-oblongis subobtusis non revolutis, coronæ lobis quam columna staminum duplo longioribus erectis basi anguste complicatis tridentatis superne in laminas cuneato-oblongas vel spathulato-oblongas expansis apice denticulatis.

Habitat.—Mountains east of Lake Nyassa, *Johnson.*

Folia 2–4 poll. vel ultra longa, 5–9 lin. lata. *Pedunculi* 1–2 poll. longi. *Pedicelli* 6–8 lin. longi. *Sepala* 3½–4 lin. longa. *Corollæ lobi* 5 lin. longi, 2½–3 lin. lati. *Coronæ lobi* 3 lin. longi.

359. **Margaretta orbicularis**, *N. E. Brown;* caulibus simplicibus pubescentibus, foliis brevissime petiolatis linearibus vel lineari-lanceolatis acutis vel acuminatis utrinque pubescentibus, umbellis paucis subcorymbosis pedunculatis, pedunculis pedicellis atque sepalis lanceolato-acuminatis subtomentosis, corollæ lobis oblongis obtusis apice revolutis, coronæ lobis basi complicato-bidentatis abrupte in laminas orbiculatas expansis.

Habitat.—Nyassaland: Moravi country, west of Lake Nyassa, *Kirk;* Elephant Marsh, north Nyassa, *Scott.*

Caules ½–2 ped. alti. *Folia* 2–4¾ poll. longa, 2–7 lin. lata. *Pedunculi* ¼–3½ poll. longi. *Pedicelli* 2–4 lin. longi. *Sepala* 2–2¼ lin. longa. *Corollæ lobi* 3½–4 lin. longi, 1¼–1¾ lin. lati. *Coronæ lobi* 4–4½ lin. longi, 3–4 lin. lati.

360. **Cynanchum complexum**, *N. E. Brown;* volubile, foliis cordatis acutis vel obtusis mucronatis glabris, umbellis pedunculatis 8–12 floris, sepalis ovatis acutis, glabris, corollæ lobis lineari-oblongis obtusis glabris, corona tubulosa 10-dentata intus lobis 5 brevibus complicatis instructa dentibus subulatis subæqualibus.

Habitat. — Shire Valley above the Cataracts, Shamo, and near Mazzaro, *Kirk.* Shupanga Forest and Chiloane, *Scott.*

Foliorum petioli ½–1½ poll. longi, laminæ 1–2 poll. longæ, 7½–16 lin. latæ. *Pedunculi* 4–18 lin. longi. *Pedicelli* 3–5 lin. longi. Sepala ¾ lin. longa. *Corollæ lobi* 2–3 lin. longi, ¾ lin. lati. *Coronæ tubus* 1–1¼ lin. longus, dentes 1 lin. longi.

361. **Cynanchum fraternum**, *N. E. Brown;* volubile, foliis oblongo-ovatis acuminatis basi rotundatis vel cordatis, racemis brevibus umbelliformibus pedunculatis, pedunculis pedicellisque puberulis, sepalis late ovatis subacutis parce pubescentibus, corollæ lobis oblongis obtusis glabris, corona tubulosa 10-dentata intus nuda dentibus lineari-filiformibus alternis multo brevioribus.

Habitat. — Abyssinia: Tigré, *Schimper;* near Djeladjeranne, *Schimper*, 1802.

Foliorum petioli 2–6 lin. longi, laminæ ¾–2 poll. longæ, 4–12 lin. latæ. *Pedunculi* 1–4 lin. longi. *Pedicelli* 1½–4 lin. longi. *Sepala* ½ lin. longa. *Corollæ lobi* 1 lin. longi. *Coronæ tubus* ½–⅔ lin. longus, dentes longiores 1–1¼ lin. longi, dentes breviores ¼–⅓ lin. longi.

362. **Cynanchum clavidens**, *N. E. Brown;* ramis lignosis gracilibus, foliis hastatis acutis vel obtusis glabris, umbellis sessilibus 5–6-floris, pedicellis puberulis sepalis ovatis vel lanceolatis acutis puberulis, corollæ lobis lanceolatis obtusis marginibus revolutis, corona tubulosa 10-dentata intus 10-plicata, dentibus clavatis alternis brevioribus.

Habitat.—Somaliland: Boobi, *James & Thrupp.*

Foliorum petioli 6–8 lin. longi, laminæ 6–12 lin. longæ, basi 3½–4 lin. latæ. *Pedicelli* 2½–4 lin. longi. *Sepala* ¾–1½ lin. longa. *Corollæ lobi* 2 lin. longi, ¾ lin. lati. *Coronæ tubus* ⅔ lin. longus, dentes longiores ⅓ lin. longi.

363. **Cynanchum hastifolium,** *N. E. Brown;* volubile, foliis hastatis acutis glabris, umbellis sessilibus paucifloris, pedicellis sepalisque subulatis puberulis, corollæ lobis linearibus acutis marginibus revolutis, corona tubulosa 10-dentata intus carinarum paribus 5 instructa dentibus elongato-deltoideis et filiformibus alternantibus cum denticulis minutis interjectis.

Habitat.—Abyssinia: near Djeladjeranne, *Schimper*, 1690.

Foliorum petioli 3–6 lin. longi, laminæ 4–16 lin. longæ, basi 3–7 lin. latæ. *Pedicelli* 2–3 lin. longi. *Sepala* 1 lin. longa. *Corollæ lobi* 2½–3 lin. longi, ½–¾ lin. lati. *Coronæ tubus* 1⅓ lin. longus, dentes ⅔ lin. longi.

364. **Cynanchum vagum,** *N. E. Brown;* volubile, foliis elongato-ovato-oblongis acutis vel acuminatis basi cordatis glabris vel parce pubescentibus, cymis umbelliformibus multifloris pedunculatis, pedunculis pedicellis atque sepalis ovatis acutis pubescentibus, corollæ lobis ovatis subacutis glabris, corona cupulari 5-loba lobis bidentatis dentibus brevibus linearibus distantibus.

Habitat.—Congo, near Stanley Pool, *Hens*, 77.

Foliorum petioli 3–8 lin. longi, laminæ 1–2¼ poll. longæ, 4–10 lin. latæ. *Pedunculi* 1–2 lin. longi. *Pedicelli* 1–3½ lin. longi. *Sepala* ½ lin. longa. *Corollæ lobi* ⅔–¾ lin. longi. *Corona* ½ lin. longa.

365. **Cynanchum brevidens,** *N. E. Brown;* volubile, foliis elongato-oblongis acuminatis basi cordatis glabris vel parce pubescentibus, racemis brevibus umbelliformibus pedunculatis, pedunculis pedicellis atque sepalis ovatis acutis pubescentibus, corollæ lobis ovato-oblongis subobtusis glabris, corona cupulari breviter 5-dentata intus 10-carinata.

Habitat.—Congo, *Burton.*

Foliorum petioli 3–11 lin. longi, laminæ 1–2 poll. longæ, 4–9 lin. latæ. *Pedunculi* 1–3 lin. longi. *Pedicelli* 1–4 lin. longi. *Sepala* ½–¾ lin. longa. *Corolla lobi* ⅔–¾ lin. longi. *Corona* circa ⅓ lin. longa.

Var. **zambesiacum,** *N. E. Brown;* corona ½ lin. longa infra medium quinque lobata cum dentibus 5 minutis alternantibus lobis in subulam brevem acuminatis vel abruptissime contractis.

Habitat.—Zambesi: Expedition Island, *Kirk.*

366. **Tylophora oblonga,** *N. E. Brown;* volubilis glabra, foliis petiolatis oblongis vel elliptico-obovatis breviter cuspidato-acuminatis basi late cuneatis vel cuneato-rotundatis, pedunculis cymas 3–4 umbelliformes distantes gerentibus, sepalis ovatis acutis, corollæ rotatæ lobis oblique-oblongo-obovatis apice rotundatis minute fimbriatis, coronæ lobis minutis tuberculiformibus supra planis subtus convexis.

Habitat.—Fernando Po, *Mann*, 277.

Foliorum petioli 6–9 lin. longi, laminæ 2¼–3 poll. longæ, 1–1¾ poll. latæ. *Inflorescentia* 2–3 poll. longa. *Pedicelli* 3–4 lin. longi. *Sepala* ⅔–¾ lin. longa. *Corolla* 3½–4 lin. diam., lobis 1½ lin. longis, 1 lin. latis.

367. **Tylophora stenoloba,** *N. E. Brown;* caule volubili pubescente, foliis petiolatis oblongis vel elliptico-oblongis obtusis mucronulatis basi obtusis vel cuneato-rotundatis glabris, umbellis ad nodos sessilibus plurifloris, pedicellis capillaribus glabris, sepalis lanceolatis acuminatis glabris, corollæ lobis e basi ovata linearibus apice leviter dilatatis glabris,

coronæ lobis tuberculiformibus basi truncatis superne angustatis.—*Astephanus stenolobus*, K. Schum. in Engler Pflanzenw. Ost.-Afr. Th. C. p. 321.

Habitat.—Usambara: Doda, *Holst*, 2977*a*.

Foliorum petioli 1½–2 lin. longi, laminæ 9–15 lin. longæ, 4–8 lin. latæ. *Pedicelli* 7–8 lin. longi. *Sepala* ½ lin. longa. *Corollæ lobi* 2½ lin. longi.

This plant has been placed by Dr. Schumann in the genus *Astephanus* among the *Cynancheæ*, but the whole structure of the flower is that of a *Tylophora*.

368. **Tylophora conspicua**, *N. E. Brown;* caule volubili tomentoso, foliis petiolatis oblongis vel obovato-oblongis breviter acuminatis vel cuspidatis basi cordatis, glabris venis pubescentibus, pedunculis pubescentibus cymas 2 umbelliformes gerentibus, sepalis ovato-lanceolatis acutis pubescentibus, corollæ rotatæ glabræ lobis oblique orbiculari-oblongis obtusis, coronæ lobis tuberculiformibus ovoideis.

Habitat.—Angola: Golungo Alto, *Welwitsch*, 4214, 4215.

Foliorum petioli 9 lin.—2¾ poll. longi, laminæ 2½–7 poll. longæ, 1¾-3½ poll. latæ. *Pedunculi* 9-12 lin. longi. *Pedicelli* 3–4 lin. longi. *Sepala* 2 lin. longa. *Corolla* 7–8 lin. diam., lobis 2½ lin. longis et latis. *Coronæ tuberculi*, 1 lin. longi.

369. **Tylophora cameroonica**, *N. E. Brown;* caule volubili glabro, foliis petiolatis ovatis vel elliptico-ovatis cuspidato-acuminatis basi cordatis glabris, cymis laxis ramulis cymulas umbelliformes plurimas gerentibus primum ferrugineo-puberulis demum glabratis, sepalis lanceolatis acutis glabris, corollæ rotatæ lobis ovatis subobtusis, coronæ lobis tuberculiformibus.

Habitat.—Cameroons: Rio del Rey, *Johnston*.

Foliorum petioli 9–15 lin longi, laminæ 3–5½ poll. longæ, 2–3 poll. latæ. *Cymæ* 4–5 poll. diam. *Pedicelli* 1½–2 lin longi. *Sepala* ½–⅔ lin. longa. *Corolla* 2½ lin. diam., lobis 1 lin. longis, ¾ lin. latis. *Coronæ lobi* ⅓ lin. longi.

370. **Marsdenia angolensis**, *N. E. Brown:* volubilis, foliis cordato-ovatis acuminatis supra pubescentibus subtus subtomentosis, cymis laxis ramulis apice umbelliferis pubescentibus umbellis 10–14-floris, sepalis obovato-oblongis vel elliptico-oblongis obtusis, corollæ campanulatæ lobis elliptico-oblongis obtusis extus pubescentibus intus glabris, coronæ lobis lineari-oblongis basi dilatatis bicarinato-alatis.

Habitat.—Angola, *Welwitsch*, 4245, 4250.

Foliorum petioli 1–1½ poll. longi, laminæ 2–3 poll. longæ, 1¼–2 poll. latæ. *Pedicelli* 4–5 lin. longi. Sepala ¾–1 lin. longa, ½–⅔ lin. lata. *Corollæ tubus* 1½–2 lin. longus, lobi ⅔–1 lin. longi. *Coronæ lobi* 1½ lin. longi.

371. **Marsdenia profusa**, *N. E. Brown;* volubilis, foliis elliptico-cordatis cuspidatis vel acuminatis glabris, paniculis e 3–5 ramulis compositis umbellas plurimas sessiles gerentibus sepalis late ellipticis obtusis minutissime ciliatis, corollæ rotato-campanulatæ lobis ovatis acutis glabris, coronæ lobis oblongis subacutis planis.

Habitat.—Niger Territory: Brass, *Barter*, 16.

Foliorum petioli 1–2 poll. longi, laminæ 3–5 poll. longæ, 2–3½ poll. latæ. *Paniculæ* 5–8 poll. longæ. *Pedicelli* 1¼–1¾ lin. longi. *Sepala* ½ lin. longa. *Corolla* 1½ lin. diam. *Coronæ lobi* ¼ lin. longi.

372. **Anisopus**, *N. E. Brown;* [Marsdeniearum genus novum]. *Calyx* 5-partitus. *Corollæ* tubus brevis; limbus 5-lobus, lobis patentibus valvatis. *Corona* duplex; exterioris lobi 5 sub sinubus corollæ affixi; interioris lobi 5 columnæ staminum affixi antheris oppositi. *Columna staminum* e basi corollæ exorta; antheræ erectæ, membranaceo-appendiculatæ. *Pollinia* in quoque loculo solitaria, erecta. *Stylus* ultra antheras breviter exsertus, apice bifidus.—*Fructus* volubilis, glaber. *Folia* opposita. *Umbellæ* axillares, oppositæ, altera pedunculata altera sessilis.

Anisopus Mannii, *N. E. Brown;* foliis herbaceis petiolatis ellipticis vel elliptico-oblongis abrupte acuminatis basi rotundatis, umbellis globosis multifloris solitariis vel pedunculis 2–4 fasciculatis bracteatis, bracteis foliosis, sepalis elliptico-ovatis obtusis, corollæ lobis ovatis subacutis extus glabris intus pubescentibus, coronæ exterioris lobis semiorbiculatis pubescentibus, coronæ interioris lobis carnosis lineari-oblongis columnæ staminum æquilongis basi adnatis apice liberis incurvis acutis obtusis vel minute bifidis dorso canaliculatis.

Habitat.—Corisco Bay, *Mann*, 1862.

Foliorum petioli ½–¾ poll. longi, laminæ 2¼–3 poll. longæ, 1¼–1¾ poll. latæ. *Pedunculi* ½–2 poll. longi. *Pedicelli* 3½–4 lin. longi. *Sepala* ¾ lin. longa. *Corollæ tubus* 1–1¼ lin. longus, lobi 1½ lin. longi. *Coronæ exterioris lobi* ¼ lin. longi, ½ lin. lati, interioris lobi 1–1¼ lin. longi.

373. **Pergularia africana**, *N. E. Brown;* volubilis, glabra, foliis ovato-oblongis vel late ovatis breviter, cuspidatis apice obtusis basi rotundatis cordatis vel cuneatis glabris vel supra parce puberulis, umbellis lateralibus pedunculatis vel subsessilibus multifloris, pedicellis sepalisque lanceolatis vel ovatis acutis glabris, corollæ hypocrateriformis tubo basi inflato fauce dense villoso lobis linearibus obtusis intus breviter villosis, coronæ lobis elliptico-lanceolatis orbiculari-obovatis vel obovato-oblongis obtusis vel subacutis intus ligula lineari vel lanceolato-attenuata acuta instructis.

Habitat.—Lagos, *Rowland.* Niger Territory: Nupe and Ifaye, *Barter*, 3332; Old Calabar, *Thomson.* Sierra Leone, *Elliot*, 4589, 5498, 5553. Natal, *McKen*, 2, *Wood*, 3395.

Folorium petioli 4 lin.—3 poll. longi, laminæ 2–4 poll. longæ, 1–3 poll. latæ. *Pedunculi* 0–5 lin. longi. *Pedicelli* 2–3 lin. longi. *Sepala* 1¼–2 lin. longa. *Corollæ tubus* 3–4 lin. longus, lobi 3½–6 lin. longi, ¾ lin. lati. *Coronæ lobi* 1–1¾ lin. longi, ligula 1 lin. longa.

374. **Fockea Schinzii**, *N. E. Brown;* volubilis, foliis hysteranthiis, cymis axillaribus multifloris compactis tomentosis, sepalis ovatis acutis, corollæ lobis anguste oblongis obtusis marginibus revolutis extus glabris intus puberulis, corona tubulosa, inæqualiter 10-dentata intus paribus 5 dentium instructa dentibus cuiusque paris superpositis.

Habitat.—Angola, *Welwitsch*, 4194. Amboland; Ombandja, *Schinz.*

Pedicelli 2–5 lin. longi. *Sepala* 1–1¼ lin. longa. *Corollæ tubus* 1 lin. longus, lobi 3½–4 lin. longi. *Corona* 2 lin. longa.

375. **Fockea undulata,** *N. E. Brown;* caule basi ramoso ramis brevibus puberulis, foliis sessilibus linearibus apice revoluto-uncinatis acutis marginibus undulato-revolutis supra minute puberulis subtus glabris, floribus paucis axillaribus fasciculatis pedicellatis, pedicellis sepalisque lanceolato-deltoideis acutis puberulis, corollæ campanulatæ lobis linearioblongis obtusis extus puberulis, coronæ tubulosæ 10–lobatæ lobis trifidis alternis minoribus interdum subintegris dentibus filiformibus lateralibus multo minoribus, tubo intus 15–carinato carinis intermediis validis in dentes 5 filiformes quam tubo sublongiores excurrentibus.

Habitat.—Transvaal; Rhenoster Kop, *Burke.*

Rami 1¼–3 poll. longi. *Folia* 1–1½ poll. longa, ¾–1 lin. lata. *Pedicelli* 1 lin. longi. *Sepala* ¾–1 lin. longa. *Corollæ tubus* 1 lin. longus, lobi 2–2¼ lin. longi, ¾ lin. lati. *Coronæ tubus* 1⅓–1⅔ lin. longus, dentes longiores 1½ lin. longi.

376. **Riocreuxia profusa,** *N. E. Brown;* foliis petiolatis ovatis vel elliptico-ovatis breviter cuspidatis acutis basi cordatis supra glabris subtus venis pubescentibus, cymis magnis glabris, cymulis 3–4-floris, sepalis lanceolatis acuminatis glabris, corollæ tubo basi leviter inflato utrinque glabro lobis lineari-lanceolatis apice connatis glabris, coronæ exterioris lobis subrectangularibus bifidis, coronæ interioris lobis linearibus acutis truncatis vel bifidis conniventibus.

Habitat.—Nyassaland, Shire Highlands, *Buchanan*, 205, 455.

Foliorum petioli 1–2½ poll. longi, laminæ 2½–5½ poll. longæ, 1½–4 poll. latæ. *Cymæ rami* ½–7 poll. longi. *Pedicelli* ¾–1½ poll. longi. *Sepala* 1½ lin. longa. *Corolla* 7–8½ lin. longa. *Coronæ exterioris interiorisque lobi* ½ lin. longi.

377. **Ceropegia constricta,** *N. E. Brown*; caule volubili glabro, foliis ovatis vel ellipticis subabrupte acutis mucronatis basi late cuneatis setuloso-denticulatis glabris, pedunculis 2–3-floris, sepalis lanceolato-acuminatis glabris, corollæ tubo curvato parte inflata medio constricta apice infundibulariformi extus glabro intus in fauce hirto, lobis apice connatis deltoideo-ovatis replicatis intus carinatis hirtis et ciliatis, coronæ exterioris lobis minutis bursæformibus, interioris lobis linearisubulatis apice connatis basi carinatis.

Habitat.—Tanganyika, *Carson*, 35.

Foliorum petioli, 3–4 lin. longi, laminæ 9–15 lin. longæ, 5–10 lin. latæ. *Pedunculi* 9–15 lin. longi. *Pedicelli* 3–5 lin. longi. *Sepala* 2 lin. longa. *Corollæ tubus* 1¼ poll. longus, lobi 4–6 lin. longi. *Coronæ interioris lobi* 1⅓ lin. longi.

378. **Ceropegia subtruncata,** *N. E. Brown;* caule volubili unifariam pubescente, foliis petiolatis ovatis vel oblongo-obovatis subcuspidato-acuminatis subtus pilosis ciliatis, floribus solitariis pedicellatis, sepalis lanceolato-attenuatis parce pubescentibus, corollæ tubo curvato glabro basi leviter inflato limbo subtruncato apiculato lobis late rhomboideis replicatis apice connatis glabris, coronæ exterioris lobis profunde bifidis, interioris lobis linearibus acutis erecto-conniventibus.

Habitat.—Abyssinia, *Schimper*, 628.

Foliorum petioli 6–9 lin. longi, laminæ 1¾–3½ poll. longæ, 1–1¾ poll. latæ. *Pedicelli* 7–9 lin. longi. *Corollæ tubus* 9 lin longus, lobi 5 lin. longi. *Coronæ exterioris lobi* ¾ lin. longi, interioris lobi 1½ lin. longi.

379. **Ceropegia nigra**, *N. E. Brown;* caule volubili pubescente, foliis petiolatis ovatis vel elliptico-ovatis acutis vel acuminatis basi cordatis vel late rotundatis pubescentibus, cymis subsessilibus plurifloris, sepalis subulatis pubescentibus, corollæ tubo curvato basi inflato apice infundibuliformi extus pubescente intus glabro, lobis liberis patentibus deltoideo-ovatis obtusis marginibus recurvis intus glabris nigris, coronæ exterioris lobis rectangularibus bifidis, interioris lobis filiformibus erectis apice incurvis penicillatis.

Habitat.—Niger territory, *Baikie.*

Foliorum petioli 4–6 lin. longi, laminæ 9–16 lin. longæ, 6–12 lin. latæ. *Pedicelli* 4–6 lin. longi. *Sepala* 1½–2 lin. longa. *Corollæ tubus* 6 lin. longus, lobi 2½ lin. longi, 1½ lin. lati. *Coronæ exterioris lobi* ⅕ lin. longi, interioris lobi 1¼ lin. longi.

380. **Ceropegia tentaculata**, *N. E. Brown;* caule volubili glabro, foliis petiolatis succulentis linearibus oblongis ovatis ovato-lanceolatis vel spathulato-obovatis acutis vel obtusis mucronulatis basi cuneato-acutis vel rotundatis glabris, umbellis sessilibus 1-multifloris, sepalis lanceolatis acutis glabris, corollæ tubo recto vel leviter curvato basi inflato apice leviter ampliato extus glabro, lobis liberis patentibus e basi deltoidea in apicem capillarem attenuatis, coronæ exterioris lobis minutis bursæformibus, interioris lobis erectis lineari-spathulatis.

Habitat.—Angola: Loanda, *Welwitsch*, 4277. Amboland: Omatope and Ondonga, *Schinz.*

Foliorum petioli 1–3 lin. longi, laminæ 9 lin.-2 poll. longæ, 1½–15 lin. latæ. *Pedicelli* 3–5 lin. longi. *Sepala* 1 lin. longa. *Corollæ tubus* 7–9 lin. longus, lobi 5–6 lin. longi. *Coronæ interioris lobi* ½ lin. longi.

381. **Ceropegia sobolifera**, *N. E. Brown;* caule volubili unifariam pubescente, foliis petiolatis lanceolatis acuminatis subtus pubescentibus ciliatis, floribus binis pedicellatis, sepalis oblongo-lanceolatis acutis glabris, corollæ tubo vix curvato subcylindrico vix inflato glabro, lobis incurvatis apice connatis replicatis intus carinatis glabris, coronæ exterioris lobis profunde bifidis ciliatis, interioris lobis linearibus erecto-conniventibus.

Habitat.—Abyssinia, *Schimper*, 463.

Foliorum petioli 2–3 lin. longi, laminæ 8–12 lin. longæ, 2–4 lin. latæ. *Pedicelli* 3–4 lin. longi. *Sepala* 1½ lin. longa. *Corolla tubus* 7–8 lin. longus, lobi 4 lin. longi. *Coronæ exterioris lobi* ¾ lin. longi, interioris lobi 1 lin. longi.

382. **Ceropegia volubilis**, *N. E. Brown;* caule volubili glabro, foliis petiolatis cordato-ovatis acuminatis mucronatis glabris ciliolatis, pedunculis glabris 2–4-floris, sepalis subulatis, corollæ tubo curvato basi inflato glabro, lobis deltoideo-oblongis erectis replicatis apice connatis superne ciliatis, corona exteriore 10-dentata ciliata, coronæ interioris lobis linearibus erectis.

Habitat.—Angola, *Welwitsch*, 4272.

Foliorum petioli 4½–9 lin. longi, laminæ 1½–2 poll. longæ, 7½–17 lin. latæ. *Pedunculi* 2–5 lin. longi. *Pedicelli* 3–4 lin. longi. *Sepala* 1½ lin. longa. *Corollæ tubus* 6–7½ lin. longus, lobi 3 lin. longi. *Coronæ exterioris dentes* ½ lin. longi, interioris lobi 1 lin. longi.

383. **Ceropegia angusta**, *N. E. Brown;* volubilis, glabra, foliis petiolatis lineari-lanceolatis acutis vel obtusis mucronulatis, basi rotundatis

subpeltatis, pedunculis 1–2-floris, floribus subdistantibus, sepalis lanceolatis attenuatis, corollæ tubo recto basi inflato extus papillato-ruguloso intus glabro, lobis conniventibus apice connatis replicatis intus carinatis carinis ciliatis, corona exteriore 10-dentata ciliata, coronæ interioris lobis linearibus connivento-erectis.

Habitat.—Angola, *Welwitsch*, 4276.

Foliorum petioli 2–3 lin. longi, laminæ 1–2¼ poll. longæ, 1¾–3 lin. latæ. *Pedunculi* 3–5 lin. longi. *Pedicelli* 2½–3 lin. longi. *Sepala* 1¼ lin. longa. *Corollæ tubus* 4½–5 lin. longus, lobi 2 lin. longi. *Coronæ exterioris dentes* ½ lin. longi, interioris lobi ¾ lin. longi.

384. **Ceropegia distincta**, *N. E. Brown;* volubilis, glabra, foliis ovato-oblongis vel late elliptico-ovatis breviter cuspidato-acutis vel acutis basi breviter cordatis, pedunculis 1–2-floris, sepalis linearibus vel subulatis acutis, corollæ tubo curvato basi inflato apice infundibuliformi, lobis inflexis et in tubum brevem angustum connatis deinde in capitulum pentagonum dilatatis, coronæ interioris lobis erectis lineari-spathulatis obtusis.

Habitat.—Zanzibar, *Kirk*, 28.

Foliorum petioli 5–8 lin. longi, laminæ 2–3 poll. longæ, 1–2 poll latæ. *Pedunculi* 1–1½ poll. longi. *Pedicelli* 4–8 lin. longi. *Sepala* 5–6 lin. longa. *Corollæ tubus* circa 1 poll. longus, lobi circa 6 lin. longi. *Coronæ interioris lobi* 1½ lin. longi.

385. **Ceropegia scandens**, *N. E. Brown;* volubilis glabra, foliis petiolatis ovatis oblongo-ovatis vel elliptico-ovatis acuminatis basi rotundatis vel emarginatis, pedunculis 4–7-floris, sepalis subulatis apice revolutis, corollæ tubo curvato basi leviter inflato, lobis erectis apice connatis oblongo-ovatis replicatis ciliatis intus carinatis, coronæ exterioris lobis bifidis ciliatis, interioris lobis erectis linearibus subacutis.

Habitat.—Angola, *Welwitsch*, 4273.

Foliorum petioli 6–9 lin. longi, laminæ 2–3¼ poll. longæ, 1¼–1½ poll. latæ. *Pedunculi* 1 poll. longi. *Pedicelli* 5 lin. longi. *Sepala* 2½–3 lin. longa. *Corollæ tubus* circa 6 lin. longus, lobi circa 5 lin. longi. *Coronæ exterioris lobi* ¼ lin. longi, interioris lobi ¾ lin. longi.

386. **Ceropegia racemosa**, *N. E. Brown;* caule volubili glabro, foliis petiolatis lanceolatis vel oblongo-lanceolatis acutis vel obtusis apiculatis basi rotundatis marginibus scaberulis, racemis 2–4-floris, floribus distantibus, sepalis ovato-lanceolatis acutis glabris, corollæ tubo recto cylindrico basi obliquo apice late infundibulariformi extus glabro intus villoso, lobis erecto-conniventibus apice connatis linearibus basi dilatatis replicatis plicis ciliatis, corona exeriore 10-dentata ciliata, coronæ interioris lobis linearibus erecto-conniventibus apice revolutis.

Habitat.—Jur: Ghattas, *Schweinfurth*, 2105.

Foliorum petioli 1½–3 lin. longi, laminæ 1¼–2 poll. longæ, 4–9 lin. latæ. *Pedunculi* 1½–4 poll. longi. *Pedicelli* 2½–3 lin. longi. *Sepala* 1½ lin. longa. *Corollæ tubus* circa 9 lin. longus, lobi 7 lin. longi. *Coronæ exterioris dentes* ½ lin. longi, interioris lobi 1 lin. longi.

387. **Ceropegia medoensis**, *N. E. Brown;* caule erecto molliter pubescente, foliis brevissime petiolatis ovatis vel oblongis obtusis vel subacutis breviter pilosis, floribus 1–2 terminalibus, sepalis lanceolato-subulatis pubescentibus, corollæ tubo recto basi inflato apice anguste

infundibuliformi extus parce pubescente, lobis elliptico-spathulatis intus carinatis apice in conum brevem latum vel umbraculum connatis glabris, corona exteriore campanulata 10-dentata, coronæ interioris lobis erectis subulatis.

Habitat.—Medo country, between Lagenda River and Ibo, *Last.*

Foliorum petioli ½–1 lin. longi, laminæ 1–1½ poll. longæ, 3–10 lin. latæ. *Pedicelli* 2–4 lin. longi. *Sepala* 3 lin. longa. *Corollæ tubus* 1½ poll. longus, lobi 1 poll. longi, 5–6 lin. lati. *Coronæ exterioris dentes* 1¼ lin. longi, interioris lobi 1 lin. longi.

388. **Brachystelma Buchanani**, *N. E. Brown;* caule erecto puberulo, foliis brevissime petiolatis elliptico-obovatis obtusissimis basi cuneatis pubescentibus, umbellis 5–7-floris in cymam terminalem dispositis, sepalis lanceolatis acuminatis pubescentibus, corollæ patelliformis lobis triangularibus acutis glabris, corona exteriore cupulari 10-dentata, dentibus deltoideo-subulatis retrorsum pubescentibus patentibus, coronæ interioris lobis lineari-oblongis super antheras incumbentibus.

Habitat.—Nyassaland: Shire Highlands, *Buchanan*, 116.

Folia 3½–4½ poll. longa, 2–2½ poll. lata. *Pedicelli*, 1 poll. longi. *Sepala* 1¾–3 lin. longa. *Corolla* 9 lin. diam. *Coronæ exteriores dentes* ½ lin. longi, interioris lobi ½ lin. longi.

389 **Brachystelma magicum**, *N. E. Brown;* foliis oblanceolato-oblongis subobtusis basi cuneatis utrinque pubescentibus, sepalis lanceolato-attenuatis, corollæ rotatæ lobis brevibus deltoideis glabris, corona exteriore 10-dentata dentibus subulatis erectis, coronæ interioris lobis linearibus super antheras incumbentibus.

Habitat.—"Collected a long day's journey this side of Ujiji" by the Belgian Consul at Zanzibar in 1884.

Folium 3½ poll. longum, 13½ lin. latum. *Pedicellus* 1 poll. longus. *Sepala* 3 lin. longa. *Corolla* 1 poll. diam. *Coronæ exterioris dentes* 1 lin. longi, interioris lobi ½–⅔ lin. longi.

Of this very distinct species I have only seen a single leaf and a flower, but probably it is a large species allied to *B. Buchanani*, N. E. Br.

390. **Echidnopsis nubica**, *N. E. Brown; E. cereiformi* similis, sepalis lanceolatis acutis minute papillatis, corolla campanulato-rotata lobis ovatis acutis extus minute papillatis, corona exteriore nulla, coronæ interioris lobis deltoideo-ovatis.

Habitat.—Nubia: between Suakin and Berber, *Schweinfurth*, 228.

Sepala ½–¾ lin. longa. *Corolla* 2 lin. diam., lobis ½–¾ lin. longis. *Coronæ interioris lobi* ¼ lin. longi.

391. **Caralluma Sprengeri**, *N. E. Brown;* caulibus quadrangulatis grosse dentatis glabris, cymis sessilibus 5–6 floris, pedicellis brevibus glabris, sepalis lanceolatis acuminatis, corolla rotata lobis ovatis acuminatis intus papillato puberulis olivaceis, corona exteriore annulari obscure crenulata, coronæ interioris lobis ovato-oblongis obtusis coronæ exteriori dorso adnatis super antheræ incumbentibus et eas subæquantibus. *Huernia Sprengeri*, Schweinfurth *ex Damman Cat.* 1893, p. 46; *Wiener Illust. Gartenzeit*, 1893, p. 143; Schumann in *Monatsschr. für Kakteenkunde*, 1893, III., pp. 74 and 104.

Habitat.—Abyssinia: Adow, *Petit*; Massowah? *Schweinfurth.*

Caules 2½–5 poll. longi, ½–¾ poll. crassi. *Pedicelli* 1½ lin. longi. *Sepala* 1½–2 lin. longa. *Corolla* 10–11 lin. diam., lobis 4–5 lin. longis, 2½–2¾ lin. diam.

392. **Caralluma hirtiflora**, *N. E. Brown;* similis *C. retrospicienti*, sed floribus duplo majoribus, pedicellis glabris, sepalis lanceolato-attenuatis, corolla rotata lobis deltoideo-ovatis acutis intus dense hirsutis, corona exteriore cupulari 10-dentata breviter hirta dentibus subulatis, coronæ interioris lobis linearibus quam antheræ longioribus glabris cum corona exteriore dorso partitionibus angustis connexis.

Habitat.—Hanish Island, in the Red Sea, *Slade*, 20.

Pedicelli 1 poll. vel ultra longi. *Sepala* 1½–2 lin. longa. *Corolla* 1¼ poll. vel ultra diam., lobis 4–5 lin. longis, 4–4½ lin. latis. *Coronæ exterioris dentes* 1 lin. longi, interioris lobi ⅓ lin. longi.

393. **Caralluma somalica**, *N. E. Brown;* caulibus probabiliter acute 4-angulatis glabris angulis breviter dentatis, umbellis terminalibus globosis multifloris, pedicellis glabris, sepalis lanceolato-attenuatis parcissime pubescentibus, corollæ tubo breviter campanulato lobis patentibus deltoideo-ovatis acutis intus microscopice velutinis non ciliatis, coronæ exterioris lobis deltoideo-oblongis apice bidentatis dorso parce et minute hirtis dentibus subulatis divergentibus basi distantibus interdum denticulo intermedio instructis, coronæ interioris lobis linearibus antheras subæquantibus.

Habitat.—Somaliland: near Magadoxo, *Kirk.*

Pedicelli 6–8 lin. longi. *Sepala* 1½–2 lin. longa. *Corolla* 6–7 lin. diam., lobis 2½ lin. longis, 2 lin. latis. *Coronæ exterioris lobi* cum dentibus 1 lin. longi, interioris lobi ⅓ lin. longi.

394. **Caralluma valida**, *N. E. Brown;* caulibus probabiliter 4-angulatis grosse dentatis glabris, pedicellis cum sepalis ovato-lanceolatis acuminatis glabris, corolla profunde lobata lobis elongato-deltoideis acutis rugosis ciliatis, coronæ exterioris lobis oblongo-lanceolatis acutis 2–3-carinatis lateribus breviter unidentatis, coronæ interioris lobis late linearibus bifidis erecto-conniventibus basi cristatis.

Habitat.—Locality uncertain, collected by *Dr. Holub* either in the Zambesi region or the Transvaal.

Caules 4 poll. vel ultra longi, 7–10 lin. crassi. *Pedicelli* 4–5 lin. longi. *Sepala* 3½ lin. longa. *Corollæ lobi* 8–9 lin. longi 2½ lin. lati. *Coronæ exterioris lobi* 1¼ lin. longi, interioris lobi 1½ lin. longi.

395. **Trichocaulon officinale**, *N. E. Brown;* caulibus iis *T. piliferi* similibus, corolla rotato-campanulata fusco-purpurea tubo nullo lobis deltoideo-ovatis subabrupte acuminatis, coronæ exterioris lobis brevibus emarginatis vel profunde bifidis coronæ interioris lobis lineari-oblongis brevibus adnatis.

Habitat.—Bechuanaland.

Pedicelli 1 lin. longi. *Sepala* 1¼ lin. longa. *Corolla* circa 5 lin. diam., lobis 2–2⅔ lin. longis, 2 lin. latis. *Coronæ exterioris lobi* ½ lin. longi, interioris lobi ⅓ lin. longi.

Dried slices of this plant were, a few years ago, imported into America as a remedy for piles; from some of these slices, presented to the Kew Herbarium by Mr. E. M. Holmes of the Pharmaceutical Society, I have made the above diagnosis.

396. **Hoodia parviflora**, *N. E. Brown*; caulibus iis *H. Gordoni* similibus, pedicellis brevibus glabris, sepalis ovato-lanceolatis glabris, corolla concava obscure 5-loba lobis apice subulato-apiculatis extus glabris intus pubescentibus, coronæ exterioris lobis bifidis concavis, coronæ interioris lobis linearibus obtusis quam antheræ brevioribus coronæ exteriori dorso adnatis.

Habitat.—Angola, *Welwitsch*, 4265.

Pedicelli 1–2 lin. longi. *Sepala* 2⅓ lin. longa. *Corolla* circa 1¼ poll. diam. *Coronæ exterioris lobi* ½ lin. longi.

397. **Duvalia dentata**, *N. E. Brown*; caulibus 6-angularibus glabris angulis longe dentatis dentibus subulato-attenuatis, cymis paucifloris, pedicellis et sepalis lanceolato-attenuatis glabris, corollæ annulo pentagono puberulo lobis elongato-deltoideis acuminatis replicatis ciliatis, corona exteriore plana pentagona, coronæ interioris lobis rhomboideo-ovoideis acutis.

Habitat.—Bechuanaland: 30 miles N.W. of Koobie, *Baines*.

Planta circa 4 poll. alta. *Pedicelli* 8–12 lin. longi. *Sepala* 3 lin. longa. *Corollæ lobi* 6–7 lin. longi, 4 lin. lati.

398. **Huernia similis**, *N. E. Brown*; caulibus elongatis obtuse 5–(6 ?)-angulatis glabris angulis brevissime dentatis, cymis 3–5-floris, pedicellis sepalisque lanceolato-acuminatis glabris, corolla late campanulata intus papilloso-aspera lobis deltoideis acuminatis, coronæ exterioris lobis minutis obtusis interioris lobis linearibus obtusis adscendentibus basi transverse carinatis.

Habitat.—Angola, *Welwitsch*, 4264.

Caules usque ad 9 poll. longi, circa 6 lin. crassi, dentes ½ lin. longi. *Pedicelli* 6–9 lin. longi. *Sepala* 2 lin. longa. *Corolla* circa 7–8 lin. diam. *Coronæ exterioris lobi* ¼–⅓ lin. longi et lati, coronæ interioris lobi ½–⅔ lin. longi.

399. **Huernia arabica**, *N. E. Brown*; caulibus 4-angulatis glabris angulis subulato-dentatis, pedicellis cum sepalis attenuato-subulatis glabris, corolla campanulata intus papilloso-scabrida lobis deltoideis acuminatis, coronæ exterioris lobis quadratis truncatis, interioris lobis e basi gradatim angustatis quam antheræ subduplo longioribus.

Habitat.—Arabia: Hille Gebel Bura, *Schweinfurth*, 374.

Caules 2–3½ poll. longi, probabiliter 5–6 lin. crassi. *Pedicelli* 3 lin. longi. *Sepala* 4 lin. longi. *Corolla* circa 7 lin. diam., lobis 3 lin. longis. *Coronæ exterioris lobi* ½ lin. longi, ⅔ lin. lati, interioris lobi ⅔ lin. longi.

400. **Stapelia vaga**, *N. E. Brown*; affinis *S. gemmiflorae*, Mass., pedicellis et sepalis ovato-lanceolatis acuminatis glabris, corollæ rotatæ lobis oblongo-lanceolatis acutis rugulosis ciliatis fusco-purpureis, coronæ exterioris lobis oblongis 4-dentatis, interioris lobis inæqualiter bicornutis cornibus subulatis.

Habitat.—Amboland: Olukonda, *Schinz*.

Pedicelli 1½–2 poll. longi. *Sepala* 3½ lin. longi. *Corolla* 2½ poll. vel ultra diam., lobis 1 poll. vel ultra longis, circa 5 lin. latis. *Coronæ exterioris lobi* 1½–1¾ lin. longi, interioris lobi 1½ lin. longi.

CCCCLXXX.—CITRUS FRUITS IN SICILY.

The orange industry in Florida was of the annual value of nearly a million sterling. As already described in the *Kew Bulletin*, 1895, pp. 125 and 166, this important industry, largely supported by British capital and energy, has practically ceased to exist. This circumstance has given rise to a possible revival of orange-growing in Jamaica and the Bahamas, which formerly supplied a good deal of the oranges consumed in the United States.

The chief seat of the orange industry in the Mediterranean is at Palermo in Sicily. In reply to many inquiries addressed to him on the subject, Mr. H. Lewis Dupuis, Her Majesty's Consul at Palermo, has prepared what may be regarded as an exhaustive account of the orange and lemon industry. This is published in a Foreign Office Report (Annual Series, 1895, No. 1544). From this report the following extracts are reproduced:—

Commerce in Oranges and Lemons (*Green Fruit.*)

So-called from their being gathered when yet green, in order to stand the voyage. Both oranges and lemons grow abundantly in the provinces of Palermo, Messina, Catania, and Syracuse; Messina is especially noted for lemons. The best oranges are those grown in the province of Catania, especially at Adernò and Biancavilla, but very many exceilent and mixed qualities are found in the province of Palmero. They are distinguished as ordinary, blood, and sweet or vanilla, and mandarins. Lemons present no variety although they have designations known to the trade. Shipments mostly go to the States. In the last 3 years the numbers of boxes exported to the States alone were as follows:—

1892–93.

	New York.	Boston.	Philadelphia.	New Orleans.	Baltimore.
	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.
Oranges - -	326,020	168,759	48,689	21,796	10,532
Lemons - -	100,423	235,186	117,353	252,722	576,752

1893–94.

	New York.	Boston.	Philadelphia.	New Orleans.	Baltimore.
	Boxes.	Boxes.	Boxes.	Boxes.	Boxes.
Oranges - -	245,217	116,029	46 255	10,062	12,318
Lemons - -	798,016	149,601	92,309	135,900	19,818

Note.—This would represent the value of 74,800*l.*

The wood for the construction of these boxes is imported from Trieste, Fiume, and Bangor, United States of America, and made up here into

cases, boxes, and half-boxes. The quantities sent to the United Kingdom are comparately small :—

—	Oranges.	Lemons.	Weight (about).	In Centimetres.		
				Length.	Depth.	Breadth.
	Number.	Number.	Lbs.			
Half boxes	80 to 180	—	44 55 66	70	18 or 25	35
Boxes	160 360	240 to 490	88	70	27 29	35
Cases	420 490	240 490	132	70 or 80	30	38

Boxes and cases are spoken of as 16, 25, 30, 36, 42, 49, &c., according to the number of oranges or lemons in each layer. The fruit that goes to the United Kingdom is in cases, and that for the United States in boxes and half-boxes. They are carefully stowed in tiers, one above the other, in the vessel's hold, in such a way as to prevent injury to the fruit. Half-boxes only contain two layers of fruit. Boxes, four and sometimes five. All, whether oranges or lemons, are wrapped in tissue paper, with paper shavings to fill up interstices, and ripen on the voyage. Naturally this fruit can never be as good as that which ripens on the tree. During the last few years fears have been entertained that this trade to the States will eventually suffer considerably on account of suitableness found in the climate and soil of Florida and California, where the trees have been extensively introduced. It follows that if the States can produce their home supplies there will be little or no demand for fruit from here, and with their system of railways, their markets will be supplied with fresh fruit which has not run the risk of deteriorating on a long sea voyage. Unfortunately, the orange crop in Florida was destroyed by the exceptionally severe cold experienced in December last. This will occasion an advance of prices in the States the effect of which will be to stimulate the trade in Sicily in 1895.

The growth of this trade has only been developed within the last 40 years, and since the introduction of steam it is four times or more as great as it was in the days of sailing craft. Commensurate with this increasing demand and prompt disposal of cargoes, the value of fruit in this country has been enhanced, and this consideration, in the words of my report of 1893, induced growers to raise their prices, and there followed temporarily a marked decrease in the demand. Fruit then was shipped at exporter's risk and this failed to answer, agents were sent over to the States to safeguard exporters' interests as it was thought, but even this measure was ineffectual, for it was found that the former induced shippers who had not their own agents in the country to send their supplies to them, under promise of greater facilities, &c. In this emergency the questionable system of money advances to shippers sprang up, in order to secure shipments, and fruit began to be put on board unfit to stand the voyage.

Shipowners, in some cases, are known to have entered into contracts with shippers for certain supplies to be put on board their vessels during the fruit season in consideration of this advance to be accounted for on settlement of freight.

Cultivation of Orange and Lemon Trees.

The following practical notes regarding the cultivation of orange and lemon trees, it is hoped, will answer the many inquiries addressed to me. The fruit is one of the chief articles of trade in Sicily. In some parts of the Island they are a source of wealth to the proprietor and afford work to thousands of men, women and children in cultivating the tree and in gathering and packing the fruit for exportation. Besides there is work in the production of essences whether of orange, lemon, mandarin, or bergamot, and concentrated lemon juice, the latter is carried on on a large scale. Vice-Consul Elford, who furnishes me with all particulars, correctly observes that the lemon is the most productive as well as the most remunerative of the class and gives the largest return per acre of land planted. The trees are set about 5 yards distant one from the other in rows and equidistant. Stony or sandy soil is apparently the best suited, for the best groves are near the beds of torrents or on the coast line from Messina to Acircale for instance, and from Milazzo to Messina and in the neighbourhood of Palermo. They will not thrive in a stiff soil such as clay, for the roots are superficial and abundant. The trees have to be well manured at least once a year, and the way is to dig a trench, say about 40 inches from the stem and bury the manure 18 inches below. Ripe stable mixed with wood ash and bone is said to yield the best and fetches the highest price. Mr. Elford points out that the blossoms of April produce the best fruit, known as primo-flore (choice fruit), which is gathered in October, and those of May yielding a second crop, gathered in November and December, these are the best crops as well as the most abundant, and upon them the proprietors base all their calculations. The blossoms of June produce fruit gathered in January and February, those of July generally fall off and little heed is taken of them, those of August are gathered in March, those of September produce a better fruit, gathered in April and May; the fruit of those of October, November, and December are known as bastards and are gathered in June, July, August, and September, whilst those of January, February, and March yield little fruit, which falls under the same denomination.

First Crops.

The first gathering occurs in October, care being taken that the lemons be not less than 3 inches in circumference; all under are left for the November gathering. Practised hands gauge the fruit with thumb and second finger. The first crop (the most valuable) is carefully selected, packed, and shipped off for early spring or summer use, and realises 30 per cent. more than any subsequent gathering; no time, therefore, is lost in sending it off as early as possible, in order to get the highest price. As I have already observed they are packed in various sized cases to suit the different markets. Those for France are of one size, those for London of another. Each case contains about 450 lemons. For the States and Trieste boxes are used, containing only about 360. All that are considered inferior are put in small cases for the Italian market, and fetch 40 per cent. less.

Second Crops.

The second gathering takes place in November, and is as good as that of October, and will keep for months in boxes if properly selected and packed; it is paler in colour, and harder to the touch. It is, therefore, often kept in cases until March, then repacked, and keeps good for a

reasonable time. This chiefly goes to the States and Russia. All small or damaged fruit, which must not be left on the tree, is collected and used for making essence from the peel, and concentrated juice from the pulp. The custom is to calculate 104 kilos. of this inferior fruit as equivalent to 1000 lemons, and charge 30 per cent. less than for the good box fruits.

Extracting Essence and Lemon Juice.

It costs about 1*s.* 4*d.* to extract the essence of 1000 lemons, and 4*l.* to make a cask of lemon-juice, including fruit, cost of cask, and labour.

Of all inferior fruit, that gathered in November is considered the best for the making of essence and lime-juice, because it contains more valuable properties, yielding 50 per cent. more than that of other months. 1000 of these give about 16 ozs. of essence, and 35 litres of raw lemon-juice, which after concentration to the normal standard of 64 ozs. of citric acid per imperial gallon is reduced to 3½ litres. On a well cultivated plantation results show that seven-eighths of November fruit is good for shipment, and only one-eighth for essence and lime-juice.

The fruit gathered in December is considered inferior, as only five-eighths is fit for exportation, and three-eighths go for making essence and lime-juice. It is packed in small cases for the States, Southern Russia, and Trieste, and is worth about 15 per cent. less than the same sized cases of November fruit. Also the per-centage of essence is about 15 ozs. less per 1000, and the juice about 14 litres more. After the juice is expressed the residue is given to the goats.

The January fruit, again, is inferior to that of December, only three-eighths being fit for packing; the rest is used for juice and essence. This fruit is perfectly yellow. Such as is fit for exportation is packed in boxes, the same as that of December; that which is not is cut and pickled in casks with salt, and then exported. Each cask contains about 3400 lemons.

February's fruit is the last of the season; it is also called the "old fruit," because the remains of previous gatherings. Nothing is now left on the tree except the green fruit of the August blossom. Of this crop only two-eighths can be packed for shipment, which on arrival have to be sold at once, as they will not keep. The remainder are used for essence, juice, and pickling, and yield about 12 ozs. of essence and about 42 litres of raw lemon-juice.

Extra Crops.

The so-called extraordinary crops depend upon the mode of cultivation, and also climatic influences. Irrigation also enters largely in bringing it about. If a tree be deprived of irrigation during the hot months of July and August, and then abundantly watered in September, a spurt is put on producing an extraordinary amount of blossom which results in the valuable May crop. This cannot be done every year, for the tree suffers from the privation alluded to, and subsequent fruit is retarded in its development. Yet when the demand for May fruit is great, and prices range from 30*s.* to 40*s.* per 1000, it is done, as these prices compensate for any loss in September and October.

The March crop, known as "biancuzzi," and which is the result of the August blossoming, is the least valuable, for it will not stand a long voyage. It is sent to Trieste in small cases. Neither does it yield essence nor juice. Prices average about 40 per cent. less than those obtained for good lemons.

The April yield from the September blossom is not much better than that of March, yet some good fruit may be picked out for packing, but nearly all is used for local purposes.

The May yield, which is also the result of the September blossom, known as "verdelli," is much sought after, and is shipped to the States in small cases; the fruit is of excellent keeping quality, and easily stands the voyage. No care is necessary in gathering or sorting the fruit, as it is all good, worth 25 per cent. more than winter-grown fruit.

The so-called "bastardi" are gathered in June and July, and are the result of October and November blossoming. They are packed in similar cases, and are sent to London, Liverpool, Trieste, and the States.

In August and September the lemon crop is smaller, and inferior to those of the previous months. It realises less on this account, and also because the lemon crop in South Spain begins.

Production of Average Plantation.

The following is a fair proportion of the divers kinds of lemons grown on a plantation of average size, which produces, we will say, 110,000 annually:—

Month.		Number of Lemons gathered.
October - - -	(about)	15,000
November - - -	„	30,000
December - - -	„	25,000
January - - -	„	20,000
February - - -	„	10,000
March - - -	„	1,000
April–September - -	„	9,000

The last is only approximate, because it depends on whether the trees have been forced or not.

Packing.

Cost of packing varies according to size of case:—

—	Large.	Small.
	s. *d.*	*s.* *d.*
Cost of case - - -	0 9	0 6
„ paper - . - -	0 6	0 4
„ gathering and packing -	0 4	0 3
Nails and hoops - -	0 1	0 1
Total - - -	1 8	1 2

Lemon Plantations.

The management of a lemon plantation demands great attention. Trees should be trained high to admit free ventilation, pruning to take place regularly once a year. Dead wood, unhealthy and redundant branches removed. In cases of a heavy crop, the branches are to be supported. Trees to be watered in summer with a little liquid manure in the water once a week, and the ground kept free from all undergrowth. Market gardening is occasionally practised between the trees, because the vegetables grown pay expenses for manure and cultivation; but it is not to be recommended, as the fruit suffers in consequence.

The tree should always be grafted on the bitter orange; if grown from the pip it is subject to a disease called the gum, which often destroys it. Grafting takes place after three years, and is practised in the same way as on the rose tree.

Vice-Consul Pignatorre also furnishes me with additional particulars on the subject. The tree requires [in Sicily] an equal temperature. Lands bordering on the coastline are the most favourable, provided the situation be a sheltered one, as the trees are very susceptible to great variation of temperature; yet they cannot be reared on a coast exposed to the strong south-west winds, nor in localities subject to frost.

The ground round lemon trees requires to be hoed three times a year—in December, after the heavy autumnal rains, in April, and lastly in May, in order that they may be easily watered in summer. To water a plantation of 2½ acres twice a week, the quantity of water required is 10,500 hectolitres to continue from May to September.

The clearing away of dried twigs and suckers precedes the pruning, and sometimes renders the latter unnecessary. A proper pruning will often enable the trees to resist the effect of a violent scirocco.

Pickling Lemons.

The pickling of lemons for exportation is a very simple process. They are first cut in two and immersed in salt water for from three to eight days; they are then placed in casks with alternate layers of salt. Salt water is then introduced to fill up spaces, and the cask is closed up ready for exportation.

Orange Flower Water.

With all this there is another industry in this connexion which it is to be regretted is lost sight of in Sicily; or, if practised, it is only on a very small scale, *i.e.*, that of collecting the petals of the blossoms, whether of orange or lemon, that fall off and cover the ground as soon as the fruit appears, for making orange-flower water, which I have seen practised in other orange-growing countries.

CCCCLXXXI.—MISCELLANEOUS NOTES.

Weather and Attendance of Visitors in September.—Kew, in common with other parts of the country, experienced exceptionally fine warm weather during the latter part of the month of September The lawns and borders were in excellent order, and visitors came in large

numbers. The highest attendance was on Sunday the 22nd September when it reached 21,427. The week-day attendance was also large, and ranged from 2619 to 3750 per day. The days were singularly bright and sunny. The effect on the plants is likely to be most beneficial, as the growth made during the rainy days of August was ripened before the arrival of frost. The highest shade temperature recorded during the month was 84° Fahr. on the 24th. This was the highest of any at Kew during recent years. It was remarkable as following a minimum temperature on the grass of 31° Fahr. on the preceding night. This gives a range of temperature during the 24 hours of 53 degrees. The hot weather lasted exactly a week, the maximum temperature never falling below 76° from the 23rd to the 30th.

Botanical Magazine.—The following plants are figured in the September number: *Helianthus debilis*, *Rumex hymenosepalus*, *Cleyera Fortunei*, *Atraphaxis Muschketowi*, and *Richardia Rehmanni*. With the exception of the *Cleyera* all the plates were prepared from plants that flowered at Kew. The *Helianthus* is a native of the South-eastern States of North America, and is one of the less ornamental species. *Rumex hymenosepalus* is the "Canaigre," a plant yielding a tanning material, fully described in the *Kew Bulletin*, 1892, pp. 63–69, and 1894, pp. 167–8. It was raised from seed sent by Dr. F. H. Goodwin, of Tucson, Arizona. *Cleyera Fortunei* is the *Eurya latifolia variegata* of gardens, which has been in cultivation in this country upwards of 30 years, but as it very rarely flowers, its true genus has only recently been determined. *Atraphaxis* is a dwarf shrub, native of Central Asia, and belonging to the *Polygonaceæ*. It has small pink and white flowers in terminal erect racemes. *Richardia Rehmanni*, from Natal, has interrupted white streaks on the leaves, and the spathes are greenish-yellow on the outside; the recurved portion of the inner surface being white suffused with pink. Tubers were sent to Kew in 1893 by Mr. Medley Wood, A.L.S., Curator of the Durban Gardens.

Queensland Cherry.—The fruit of an Euphorbiaceous plant (*Antidesma dallachyanum*, Baill.) is known as the Herbert River or Queensland Cherry. The plant yielding it is a shrub or small tree closely allied to *A. Ghæsembilla*, Gærtn. of the Eastern Archipelago and Ceylon. According to Bailey "the fruit, which in size equals that of large cherries, is of a sharp acid flavour resembling that of the red currant which it also equals in colour when made into jelly. As the European fruit is placed among medicinal plants on account of its juice being grateful to the parched palates of persons suffering from fever, this is worthy of a similar place." Kew is indebted to Mr. J. H. Maiden, F.L.S., Superintendent of the Technological Museum, Sydney, New South Wales, for fresh specimens of this interesting Australian fruit for the gardens and also for the Museums of Economic Botany.

Dried Plants from British North Borneo.—Governor Creagh, C.M.G., who has recently returned to England, brought with him a collection of dried plants made by himself and consisting of about 1100 numbers. This he has presented to Kew on the condition of the plants being worked out as soon as possible. It is expected that the collection contains a considerable number of novelties.

Fruit of Sararanga.—Mature fruit of this singular Pandanad has been received from Admiral Wharton, C.B., Hydrographer to the Admiralty. It was collected by the officers of H.M.S. "Penguin" (*Kew Bulletin*, 1895, p. 159).

Hortus Fluminensis.—Under this title Senhor J. Barbosa Rodrigues, the Director of the Botanic Garden of Rio de Janeiro, has issued a sumptuous volume to serve as a guide to visitors. In Brazil where botanical books are probably rare the detailed description may perhaps be useful, but they increase the bulk of the book to such an extent as to make it burdensome to carry about. There is one feature in this guide, however, which renders it unusually attractive among publications of a similar character. This is a series of admirably executed views in different parts of the garden. The palms are particularly attractive in those views, which include the famous avenue of *Oreodoxa regia*. It would appear too that the Director is exceedingly well housed.

Liberian Coffee.—A good deal of interest is at present shown in the cultivation of this coffee in tropical countries. The construction of suitable machines for pulping the fresh cherries has given greater confidence to planters, while the prices paid for Liberian coffee both in London and New York support the industry with the promise of stability and success. The following extract taken from the *Proceedings of the Agri.-Horticultural Society* of Madras, 1895, pp. 201–202. (evidently from the same pen as the information given in the *Kew Bulletin* 1890, pp. 247–249), will be read with interest :—

Extract from Proceedings of the Agri.-Horticultural Society of Madras.—April–June, 1895.

Liberian Coffee.—Read the following letter from Mr. H. B. Winterbotham. dated Anda Tode Estate, Vayitri, S. Wynaad, 6th May 1895 :—
"I am in receipt of your letter of the 4th May and I shall be glad to give you any information which may interest you regarding Liberian coffee in which I take a great interest. The height of this place above sea is about 2400 feet. The Liberian we find will grow from 500 feet to 3000 feet. It ripens earlier at the lowest level, and takes 14 months from blossom at this elevation to ripen its fruit, but it seems to bear very satisfactorily from 2000 to 2500 feet. The small piece from which I am collecting seeds planted 10′ × 10′ and now 14 years old has averaged over 12 cwts. clean coffee per acre for eight years past. The trees are now 20 feet high or more, and the fruit has to be picked by small boys with ladders. The first two trees planted by me 20 years ago came from Kew. They are now large trees, 33 feet high, near my bungalow, and from these nearly the whole district has been planted, there being now nearly 4000 acres under this species planted during the past six or eight years, and most of this will soon be coming into bearing and will, I believe, replace Arabian coffee almost entirely at low elevations. Temperature during monsoon is steady at about 68°. During winter (November to end of January), it is cold at night, 50° sometimes running up to 80° in sun in middle of day. From February to May

temperature runs up to 85° in the shade. Liberian coffee does not mind sun but requires a certain amount of moisture with good drainage, and does not like heavy wind. Rainfall here is from 110 to 130 inches a year, very little falls from November to end of March. The country is rather steep and hilly. But the estates near the ghauts get sometimes 200 inches. Those inland as little as 60. On all these places there is good Liberian to be seen. The sample of coffee of this giant kind is good; something like a date stone in appearance, has lately been valued at 85*s.* to 90*s.* in London, or say 10*s.* per cwt. less than Arabian. I am supplying seedlings to planters in large quantities; these, if put into nurseries 6″ × 6″ apart, shaded and watered till following June, should be plants 12″ high, and ready to go out into the open in pits 20″ × 20″. The plant does not grow very much the first year; after two years it comes on quickly. We find topping the tree or pruning in any way seems to put them back. Any other questions I shall be glad to answer."

Liberian coffee affords a striking example of the intense conservatism of persons engaged in commerce. It was first grown at Kew in 1872, nearly a quarter of a century ago. Sir Joseph Hooker spared no pains in bringing it under the notice of planters, and by 1876 it had been raised in large quantity and distributed from Kew to every tropical colony. As stated in the Report for that year (p. 10), "it excited the expectations of coffee planters in all parts of the world to the highest degree." This enthusiasm was however materially damped when the produce was found to be received with little favour in the home market. It was not till it was known to be saleable at a remunerative price in the United States that interest in its cultivation again revived. This in turn stimulated mechanical inventors in devising machines for overcoming the difficulty of pulping the berries.

Full information respecting the cultivation and curing of Liberian coffee has appeared in the *Kew Bulletin* as follows:—

Historical and Descriptive Account, 1890, pp. 245–253.
Liberian Coffee at the Straits Settlement, with value of parchment coffee cleaned and sold in London, 1888, pp. 261–263.
Yield of Liberian Coffee in Selangor and Ujong, 1890, pp. 107–108, and 1892, pp. 277–282.
Liberian Coffee in Java, 1893, p. 25.
Husking in London not advisable, *ibid.*, 132.
Liberian Coffee at Sierra Leone, *ibid.*, p. 167.
Pulping Liberian Coffee, *ibid.*, pp. 204–206.
Immunity from Attacks of Coffee-leaf Miner, 1894, p. 132.
Cultivation at the Gold Coast, 1895, pp. 12–13, and pp. 21–23.

The cultivation of Liberian coffee was strenuously advocated in Ceylon by the late Mr. A. M. Ferguson, C.M.G., who published at Colombo an excellent "History of the Introduction and Progress of the Cultivation up to 1878." It however made little progress owing to its unsuitability for the "topping treatment" which the Ceylon planters had been in the habit of applying to Arabian coffee, and latterly owing to the superior attractions of tea. From Mr. Winterbotham's experience, stated above, it would appear that in Southern India, at least, topping and pruning are not adopted with Liberian coffee.

M.S. del. et lith.

Blumea balsamifera, D C.